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Market Risk and Financial performance of Non-financial Companies Listed on the Moroccan Stock Exchange

Diby François Kassi[1,*], Dilesha Nawadali Rathnayake[1] , Akadje Jean Roland Edjoukou[2]

[1] *Dongbei University of Finance and Economics, School of Finance, 217 Jianshan Street, Dalian, China P.R*

[2] *Dongbei University of Finance and Economics, School of Accounting, 217 Jianshan Street, Dalian, China P.R*

Abstract:

This study examines the effect of market risk on the financial performance of 31 non-financial companies listed on the Casablanca Stock Exchange (CSE) over the period 2000-2016. We utilize three alternative variables to assess financial performance, namely return on assets, return on equity and profit margin. Next, we use the degree of financial leverage, the book-to-market ratio, and the gearing ratio as market risk variables. Besides, we employ the pooled OLS model, the fixed effects model, the random-effects model, the difference GMM and the system GMM models. The results show that market risk indicators have a negative and significant influence on the companies' financial performance. The elasticities are greater following the book-to-market ratio compared to the degree of financial leverage and the gearing ratio, respectively. In most cases, the firm size, the tangibility ratio, and the cash holdings ratio have a positive effect on financial performance, whereas the firms' age, the debt-to-income ratio, stock turnover, and leverage hurt the performance of these non-financial companies. Therefore, decision-makers and managers should mitigate market risk through appropriate strategies of risk management, such as derivatives and insurance techniques.

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[*] Corresponding author :

E-mail addresses: kassidiby17@gmail.com/kassidibyfnk1@yahoo.fr

1. Introduction

Financial risks are among the main problems faced by many companies, especially those listed on the stock exchange where the valuation of companies depends on market conditions. Several risks common to all businesses include liquidity risk, credit risk, market risk and other types of non-financial risks. In particular, market risk is one of the essential components of financial dangers because it is a systematic risk that investors cannot eliminate through a diversified portfolio; however, one can reduce it by using appropriate hedging strategies. Indeed, market risk is the likelihood that a company (or an investor) suffers losses due to factors that influence the global performance of the financial markets in which it is included. According to Koch and MacDonald (2006), market risk mainly includes foreign exchange risk, interest rate risk, commodity price risk and stock price risk, referring to adverse changes in exchange rate, interest rate, and stock prices.

However, some studies utilized alternative proxies for market risk such as the book-to-market ratio (Fama and Fama, 1993; Chen et al., 2005; Dempsey, 2010; Cakici and Topyan, 2014), the gearing ratio (Briston, 1981; Akhtar et al., 2011; Siyanbola et al., 2015) and a measure of the degree of financial leverage (Abid and Mseddi, 2004; Gatsi et al., 2013; Muriithi et al., 2016). These studies found a significant effect of market risk on the firms' financial performance.

Most empirical studies on financial risks and financial performance have focused on the banking sector to the detriment of non-financial firms (Nimalathasan and Pratheepkanth, 2012; Muriithi et al., 2016; Badawi, 2017, Abdellahi et al., 2017, among others). Few studies have investigated the effect of market risk, and capital structure on the performance of non-financial listed firms (Abor, 2005; El - Sayed Ebaid, 2009; Sakyi et al., 2014; Admassu, 2016). Several studies on financial risks and financial performance in the Moroccan context have given considerable attention to financial institutions (Ferrouhi, 2014; Eloitri, 2017; Bayoud et al., 2018) than non-bank companies (Ibenrissoul and Maroua, 2015).

The Casablanca Stock Exchange (CSE) was created in 1929 and included 74 listed companies with a total market capitalization of MAD 627 billion as of December 31, 2017, making it one of the ten largest stock markets in Africa after Johannesburg stock exchange and Nigerian stock exchange[1]. Also, the CSE is dominated by non-financial corporations that have played an essential role in the development of the Moroccan market. In Morocco, most publicly traded companies are exposed to financial risks, in particular to market risks neglected by previous studies of non-financial companies. Market risk is a constant threat that can affect the profitability of companies. Few studies have analyzed the impact of market risk on the profitability of non-financial companies listed in Morocco, considering various indicators of financial performance and market risk, as well as using different econometric approaches.

[1] 2017 Annual Report of the Casablanca Stock Exchange.

The aim of this study is therefore to examine the effect of market risk on the financial performance of non-financial corporations listed on the Moroccan stock exchange. We considered 31 non-financial publicly traded companies over the period 2000-2016 due to data availability. This study used three alternative measures of financial performance: return on assets, return on equity and profit margin. We also utilized a measure of the degree of financial leverage, the book-to-market ratio and the gearing ratio as market risk indicators, following the above studies and the data available for these non-financial firms. We then employed various econometric techniques such as the pooled OLS model, the fixed effects model, and the random effects model as well as the difference GMM and system GMM models for robust results analysis. We corrected the results with robust standard errors for autocorrelation and heteroscedasticity.

Overall, we found that market risk indicators had a significant adverse effect on companies' financial performance, particularly on the return on their assets and their profit margins. The book-to-market ratio is the component of the market risk that affects profitability more than other measures. This study provides empirical evidence of the negative and significant impact of market risk on financial performance in Morocco using alternative proxies for financial performance and market risk as well as various econometric techniques.

The study also has excellent benefits for supervisory boards, the leading investors of listed companies in Morocco. The directors of these listed companies could understand the impact of market risks on the financial performance of non-financial companies listed on the Moroccan stock exchange. They can also benefit from this study by applying the main recommendations, as well as by involving the relevant stakeholders in the definition of appropriate risk management strategies to mitigate market risks and optimize the financial performance of companies. The remainder of this study is structured as follows: section 2 presents the empirical literature; section 3 describes the data and methodology of this paper while part 4 reveals the results and discussions. Finally, the last chapter summarizes our findings and gives some policy recommendations.

2. Literature Review and Testable Hypotheses

Many empirical studies have investigated the effect of financial risks on the financial performance of commercial banks. Notably, most studies of the impact of market risk on performance have focused on the banking sector using bank-specific variables as market risk indicators (Nimalathasan and Pratheepkanth, 2012; Ngalawa and Ngare, 2013; Muriithi et al., 2016). For instance, Nimalathasan and Pratheepkanth (2012) used a measure of the degree of financial leverage to examine the effect of market risk on the return of equity of listed financial institutions in Sri Lanka over the period 2007-2011. They found a significant positive association between market risk and companies' financial performance. Likewise, Muriithi et

al. (2016) analyzed the impact of market risk on the financial performance of 43 commercial banks in Kenya using the fixed effects model, the random effect model and the generalized method of moments (GMM) from 2005 to 2014. They used three proxies of market risk: degree of financial leverage, foreign exchange exposure risk, and net interest margin. The authors revealed that market risk indicators had a significant adverse effect on return on equity. Furthermore, other studies have used different measures of market risk and control variables to analyze the relationship between financial risks and financial performance as follows.

· *Book-to-market Ratio*

The book-to-market ratio is a measure used to compare the book value of a company to its market value. The accounting value of a company determines its book value while its market capitalization estimates the market value. A ratio of less than one denotes an overvalued company, but a rate of more than one indicates an undervalued company. Fama and French (1993) and Lakonishok et al. (1994) indicated a strong relationship between book-to-market ratio and financial performance. Fama and French (1993) have found that the book-to-market ratio was a market risk-factor predicting stocks returns. Chen et al. (2005) showed that the book-to-market ratio and the firm size are indicators of risk in investment decisions. They proved that firm size and book-to-market ratio had a strong relationship with the betas of the returns of various industries from 1981 to 2001. Besides, Dempsey (2010) utilized the book-to-market ratio as a proxy for risk in his study of Australian markets. He found a positive link between the firms' book-to-market ratio and stock returns. Cakici and Topyan (2014) found that the book-to-market ratio was a significant predictor of the future returns of companies in eight emerging Asian markets from January 1992 to December 2012.

· *Degree of Financial Leverage*

The degree of Financial Leverage (DFL) measures the rate of changes in EPS for a unit change in earnings before interest and taxes (EBIT). It is also the ratio of earnings before interest and taxes (EBIT) to earnings before taxes (EBIT – Interest expenses).

Bhatti et al. (2010) studied the relationship between financial leverage, systematic risk, and profitability of eight non-financial enterprises in Pakistan from January 2005 to December 2009. They showed a significant positive link between financial leverage and systematic risk. Likewise, Alaghi (2011) also showed a positive association between financial leverage and market risk. Gatsi et al. (2013) found a significant and contrasting effect of the degree of financial leverage on the performance of eighteen (18) insurance companies in Ghana from 2002 to 2011. Dimisyqiyani et al. (2015) showed that the degree of financial leverage has a significant positive effect on return on equity. Moreover, Muriithi et al. (2016) examined the relationship between market risk and financial performance of 43 commercial banks in Kenya over the period 2005-2014 using the fixed effects model, the random effects model and the generalized method of moments (GMM). The authors found that the degree of financial leverage had a

significant opposite effect on return on equity.

· *Gearing Ratio*

The gearing ratio is an indicator of financial leverage that shows how creditor financing or equity capital supports the company's activities. It indicates a financial ratio that compares borrowed funds to owner's equity. Linsley and shrives (2006) pointed out the gearing ratio as a measure of financial risk. Briston (1981) revealed an inverted relationship between the gearing ratio and companies' profitability whereas Akhtar et al. (2011) and Siyanbola et al. (2015) found a positive effect of gearing ratio on financial performance from their study on Nigerian companies. However, Enekwe et al. (2014) showed a negative relationship between the gearing ratio (debt-to-equity ratio) and the return on assets in six pharmaceutical companies quoted in Nigeria from 2001 to 2012.

· *Firm Age*

The firm age represents the number of years the company has been in existence since its creation. Many studies have shown that the age of companies has a mixed impact on their profitability (Ilaboya and Ohiokha, 2016; Akben-Selcuk, 2016; Pervan et al., 2017). For instance, Akben-Selcuk (2016) found a significant negative and convex nexus between firms' age and their return of assets for 302 non-financial companies listed in Turkey from 2005 to 2014 by using the fixed effects model. Ilaboya and Ohiokha (2016) showed the significant positive effect of firms' age on financial performance of 30 companies listed in Nigeria from 2006 to 2012. However, Pervan et al. (2017) showed that firms' age had a significant adverse effect on the financial performance of 956 Croatian food companies over the period 2005-2014.

· *Cash Holding Ratio*

The cash holding ratio is the ratio of a company's cash and cash equivalent assets to its total liabilities. It indicates the degree to which available funds can repay current debts. Bhutto et al. (2011) found that the cash holding ratio has an opposite effect on return on equity. Aiyegbusi and Akinlo (2016) suggested that the cash holdings have a significant positive effect on the financial performance of selected firms listed in Nigeria from 2001 to 2012 by using the generalized method of moments, following other studies (Akinyomi, 2014; Abushammala and Sulaiman, 2014).

· *Debt-to-income Ratio*

The debt-to-income ratio is a measure of a company's ability to repay its obligations. It is calculated by dividing the total debt of the corporation by its gross income, expressed as a percentage. Fout et al. (2018) identified the debt-to-income ratio among a range of risk factors which can influence the firms' financial performance.

· *Debt-to-assets Ratio*

The debt-to-assets ratio is an indicator of financial leverage which reveals the percentage of total assets that were financed by debts. The debt-to-assets ratio is determined by dividing a firm's total debts by its total assets. Some studies revealed that the debt-to-assets ratio had a positive effect on companies' financial performance (Gill and Obradovich, 2012; Davydov, 2016; Detthamrong et al. 2017). However, other studies found a negative association between the debt-to-assets ratio and the firms' performance (Luper and Isaac, 2012; Zelgalve and Berzkalne, 2015; Le et al. 2017). Likewise, Amraoui et al. (2018) found a significant negative relationship between debt-to-assets ratio and financial performance of 52 firms listed in Morocco from 2009 to 2016 by using a simple pooled OLS model, with similar results in Amraoui et al. (2017).

· *Firm Size*

Some studies have shown that the size of the firms, regarding total assets, hurts financial performance (Ammar et al., 2003; Goddard et al., 2005; Amraoui et al., 2017; Amraoui et al., 2018). On the other hand, other studies have revealed that the size of a company had a positive and significant influence on its profitability (Jang and. Park, 2011; Al-Najjar, 2014; Davydov, 2016; Ilaboya and Ohiokha, 2016). Bayoud et al. (2018) examined the relationship between firms' size and financial performance of six banks listed in the Moroccan stock exchange over the period 2004-2016 by using the Fully Modified Ordinary Least Squares (FMOLS). They found that the firms' size positively and significantly affected their return on equity but had a significant opposite effect on their return on assets.

· *Tangibility Ratio*

The tangibility ratio represents the ratio of tangible fixed assets to total assets. Okwo et al. (2012) and Azadi (2013) showed the positive relationship between the tangibility ratio and financial performance, while Razaq and Akinlo (2017) found that the tangibility ratio had a significant adverse effect on firms' profitability.

· *Stock Turnover*

Stock turnover is the frequency with which a company's inventory is "turned" or sold in a given period. It is also known as inventory turnover and is an efficiency ratio that estimates how well the stock is overseen. Nawaz et al. (2016) found that stock turnover had a positive and significant effect on the return on equity of non-financial companies listed in Pakistan from 2010 to 2014. Raheman and Nasr (2007) and Khan et al. (2016) revealed that stock turnover had a negative effect on firms' profitability.

Therefore, as a result of these empirical studies, we assume that market risk has a significant effect on the financial performance of non-financial companies listed on the Moroccan stock exchange.

In particular, we make the following assumptions:

Hypothesis H_1: Market risk has a significant effect on the return on assets of these firms.
Hypothesis H_2: Market risk significantly affects the return on equity of these firms.
Hypothesis H_3: Market risk has a significant effect on the companies' profit margin.

3. Data and Methodology

3.1. Data and Sample

This study examines the effect of market risk on the performance of non-financial companies listed in Morocco (Casablanca Stock Exchange, CSE) over the period 2000-2016. Our sample is made up of 31 non-financial companies listed on the Moroccan stock exchange (see appendix). We used the data from the financial statements of the companies. In particular, we used the database of Orbis and Osiris Bureau van Dijk (BvD) for these listed companies. We considered this sample and data period for several reasons. First, our study follows a series of previous studies on risk management and financial performance in non-financial corporations (Farooqi et al., 2014), as financial firms follow different supervisory rules than other types of companies. Secondly, we excluded financial companies because only 6 financial companies (banks) were listed on the Moroccan stock exchange during our sampling period and most of their data covered the period 2011-2016. Third, we excluded other non-financial firms because of a large amount of missing data in order to obtain more accurate data for our study. As a result, our study used unbalanced panel data from 31 non-financial listed companies over the period 2000-2016. We transformed the variables into US dollars based on the exchange rate of the study period for those expressed in Moroccan dirham (MAD).

3.2. Description of variables

We alternatively employed three (03) measures of financial performance widely used in previous studies (Abdellahi et al., 2017; Badawi, 2017), namely: return on assets, return on equity and profit margin. Then, this study utilized a measure of the degree of financial leverage (Dimisyqiyani et al., 2015; Muriithi et al., 2016), the book-to-market ratio (Fama and French, 1993; Dempsey, 2012; Cakici and Topyan, 2014) and the gearing ratio (Briston, 1981; Akhtar et al., 2011; Siyanbola et al., 2015) as indicators of market risk. Finally, we added seven (07) control variables that influence firms' financial performance, such as firm age (Ilaboya and Ohiokha, 2016; Akben-Selcuk, 2016; Pervan et al., 2017), the cash holdings ratio (Bhutto et al., 2011; Akinyomi, 2014), the debt-to-income ratio (Fout et al., 2018), the debt-to-assets ratio (Gill et al., 2012; Zelgalve and Berzkalne, 2015), firm size (Jang and Park, 2011; Al-Najjar, 2014), the tangibility ratio (Okwo et al., 2012; Azadi, 2013) and stock turnover (Khan et al., 2016; Nawaz et al., 2016). Table A.1 presents a detailed description of all variables in the Appendices 'section.

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3.3. Empirical Analyzes and Model Specification

Our empirical analyzes started with descriptive statistics and correlation analysis to avoid problems of multicollinearity among the variables. As a result, we removed the highly correlated variables from the model before the regression analysis.

In this section, we employed a modified static model following previous empirical studies using three alternative measures of financial performance (Siyanbola et al., 2015; Zelgalve and Berzkalne, 2015; Muriithi et al., 2016; Admassu, 2016; Abdellahi et l., 2017, among others):

$$ROA_{it} = \beta_0 + \beta_1 DFL_{it} + \beta_2 BMR_{it} + \beta_3 GEAR_{it} + \beta_4 AGE_{it} + \beta_5 CASH_{it} + \beta_6 DIR_{it} + \beta_7 LEV_{it} + \beta_8 SIZE_{it} + \beta_9 TANG_{it} + \beta_{10} TURN_{it} + \alpha_{1i} + \varepsilon_{1it} \quad (1)$$

$$ROE_{it} = \delta_0 + \delta_1 DFL_{it} + \delta_2 BMR_{it} + \delta_3 GEAR_{ii} + \delta_4 AGE_{it} + \delta_5 CASH_{it} + \delta_6 DIR_{it} + \delta_7 LEV_{it} + \delta_8 SIZE_{it} + \delta_9 TANG_{it} + \delta_{10} TURN_{it} + \alpha_{2i} + \varepsilon_{2it} \quad (2)$$

$$PROF_{it} = \phi_0 + \phi_1 DFL_{it} + \phi_2 BMR_{it} + \phi_3 GEAR_{ii} + \phi_4 AGE_{it} + \phi_5 CASH_{it} + \phi_6 DIR_{it} + \phi_7 LEV_{it} + \phi_8 SIZE_{it} + \phi_9 TANG_{it} + \phi_{10} TURN_{it} + \alpha_{3i} + \varepsilon_{3it} \quad (3)$$

Where:

ROA: Return on assets; *ROE*: Return on equity; *PROF*: Net profit margin; *DFL:* Degree of financial leverage; *BMR*: Book-to-market ratio; *GEAR*: Gearing ratio; *AGE*: Firm age; *CASH*: Cash holdings ratio; *DIR*: Debts-to-income ratio; *LEV*: debts-to-total assets ratio; *SIZE*: firm size; *TANG*: Tangibility ratio; *TURN:* Stock turnover.

All the β_0, δ_0, and ϕ_0 are the constant terms whereas β_i, δ_i, and ϕ_i are the coefficients of the independent variables. α_i is the firm i specific effect and ε_{it} is the error term at time t in each model that is assumed to follow a normal distribution.

First, this study estimated the three models by using ordinary least squares (pooled OLS) ignoring the individual specific effects of firms. Second, we take into account these individual-specific effects by employing the fixed effects model and the random effects model. The fixed effects model assumes that the specific characteristics of each firm are correlated with the independent variables. In the fixed effect model, the firms' group means are constant contrary to the random effect model. The random effect model supposes that there is no correlation between the firm's specific effects and the independent variables. Third, the Hausman test is used to select the appropriate and efficient model between the random effects model and the fixed effects model. The null hypothesis of this test assumes that the random effects model is the most efficient model whereas the alternative hypothesis is that the fixed effects model is the most appropriate model. The Pooled OLS model and the selected model (fixed or random effect model) of the Hausman test are then estimated using robust standard errors to autocorrelation and heteroscedasticity.

Finally, we performed additional robustness analyses by transforming the previous models into dynamic models. We added one lagged dependent variable following previous studies

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since the current level of the firms' financial performance could also be determined by its past value as follows:

$$ROA_{it} = \gamma_0 + \gamma_1 ROA_{it-1} + \gamma_2 DFL_{it} + \gamma_3 BMR_{it} + \gamma_4 GEAR_{it} + \gamma_5 AGE_{it} + \gamma_6 CASH_{it} + \gamma_7 DIR_{it} + \gamma_8 LEV_{it} + \gamma_9 SIZE_{it} + \gamma_{10} TANG_{it} + \gamma_{11} TURN_{it} + \alpha_{4i} + \varepsilon_{4i} \quad (4)$$

$$ROE_{it} = \theta_0 + \theta_1 ROE_{it-1} + \theta_2 DFL_{it} + \theta_3 BMR_{it} + \theta_4 GEAR_{it} + \theta_5 AGE_{it} + \theta_6 CASH_{it} + \theta_7 DIR_{it} + \theta_8 LEV_{it} + \theta_9 SIZE_{it} + \theta_{10} TANG_{it} + \theta_{11} TURN_{it} + \alpha_{5i} + \varepsilon_{5i} \quad (5)$$

$$PROF_{it} = \lambda_0 + \lambda_1 PROF_{it-1} + \lambda_2 DFL_{it} + \lambda_3 BMR_{it} + \lambda_4 GEAR_{it} + \lambda_5 AGE_{it} + \lambda_6 CASH_{it} + \lambda_7 DIR_{it} + \lambda_8 LEV_{it} + \lambda_9 SIZE_{it} + \lambda_{10} TANG_{it} + \lambda_{11} TURN_{it} + \alpha_{6i} + \varepsilon_{6i} \quad (6)$$

Where: ROA_{it-1}, ROE_{it-1}, and $PROF_{it-1}$ are the one period lagged dependent variables for firm i at year t-1 and γ_1, θ_1 and λ_1 their coefficients, respectively; γ_0, θ_0, and λ_0 are the constant terms whereas γ_i, θ_i, and λ_i (for i different from 0 and 1) are the coefficients of the independent variables. α_i is the firm i specific effect and ε_{it} is the error term at time t in each model that is assumed to follow a normal distribution.

We estimate these models by using the generalized methods of moments (GMM) to solve the problem of endogeneity induced by the presence of the lagged dependent variable as a regressor. In particular, we use the Arellano and Bond (1991)' difference GMM and the Arellano and Bover (1995)' system GMM to investigate the robustness of our previous results from models (4) to model (6). The difference GMM transforms all independent variables using the first difference eliminating the time-invariant fixed effects. Also, the difference GMM constructs instruments for endogenous independent variables that must be uncorrelated with the error term but strongly correlated with the primary independent variables. However, the system GMM is an alternative estimator that eliminates the problem of potentially weak instruments from the difference GMM by adding a new set of instruments. The system GMM creates a system of equations by combining the level-equations with the difference-equations in order to create valid instruments to solve the problem of endogeneity.

4. Empirical results and discussions

4.1. Descriptive statistics

Table 1 presents the descriptive statistics of all variables over the period 2000-2016. Panel A shows the results for the companies' financial performance variables. The number of observations is 414 for the *ROA* and 413 for the *ROE* and *PROF* respectively of the non-financial firms from 2000 to 2016. The mean for the *ROA* (*ROE* respectively) is 10.142 (17.926 respectively) showing that on average a 1% increase in total assets (shareholders' equity) of the firms generates approximately 10.14% (17.93%) growth in their net income. On average, the firms converted about 12.42% of their sales into profits over the period 2000-2016. The results also show a significant variation in the *ROE* of the companies (31.10%) from its mean value compared to the *PROF* (13.42%) and the *ROA* (10.14%), as described by the values of their standard deviations.

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Table 1: Descriptive Statistics

Variables	Obs.	Mean	Std.Dev	Min	Max	Sum
Panel A: *Performance variables*						
ROA	414	10.142	9.034	-22.970	36.920	4199.050
ROE	413	17.926	31.109	-511.440	75.930	7403.760
PROF	413	12.417	13.420	-66.350	96.710	5128.380
Panel B: *Market risk variables*						
DFL	382	1.333	3.277	-24.000	51.000	509.312
BMR	324	0.781	0.669	-0.588	4.633	253.2769
GEAR	370	72.002	109.833	0.020	975.680	26641.040
Panel C: *Control variables*						
AGE	527	39.967	25.018	1.000	97.000	21063.000
CASH	411	-3.258	1.555	-9.974	-0.828	-1339.140
DIR	355	-5.805	388.881	-7220.288	1059.781	-2061.051
LEV	413	-0.792	0.442	-2.082	0.031	-327.437
SIZE	414	11.878	1.656	8.443	15.590	4917.581
TANG	356	-1.834	1.461	-5.805	0.520	-652.914
TURN	410	14.251	27.980	0.410	285.480	5843.004

Note: *ROA* = return on assets, *ROE*= return on equity, *PROF*= profit margin, *DFL*= degree of financial leverage, *BMR*= book to market ratio, *GEAR*= gearing ratio, *AGE*= firm age, *CASH*= cash holdings ratio, *DIR*= debts to income ratio, *LEV*= debt-to-assets ratio, *SIZE*= firm size, *TANG* = tangibility ratio, *TURN*= stock turnover. *Obs* and *Std. Dev* denote the number of observations and standard deviation of the variables respectively whereas Min and Max indicate the minimum and maximum values of the variables. *Mean,* and *Sum* represent the mean and sum of the variables over the period 2000-2016 for the 31 non-financial firms.

The *ROA* of the firms ranges from a negative value of -22.97 (a loss) to a high of 36.92, whereas their profit margin of 96.71 reveals that 96.71% of their sales generated a maximum net income. Panel B results show that the averages for *DFL, BMR,* and *GEAR* are 1.333, 0.781 and 72.002 respectively. For instance, the mean of the book-to-market ratio (*BMR*) is less than 1, which means that companies were overvalued from 2000 to 2016. The last panel C presents the descriptive statistics of the control variables. The averages of *DIR, SIZE, TANG, CASH,* and *TURN* are -5.805, 11.878, -1.834, -3.258 and 14.251 respectively. The proportion of firms' fixed assets has been reduced by 1.834 compared to their total assets. The average age of firms was around 40 years from their creation until 2016, with a relatively high dispersion among firms (25%). The average level of leverage (*LEV*) decreased by 79.20% over the sample period and was relatively dispersed (44.23%) from one company to another.

4.2. Correlation Analysis

Table 2 presents the results of the correlation levels between the variables. We find that the market risk variables (*DFL, BMR,* and *GEAR)* have a negative and significant (except for *DFL*)

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association with the indicators of financial performance (*ROA*, *ROE*, and *PROF*) at 1% level. Besides, *AGE*, *CASH*, *SIZE*, and *TANG* have a positive and significant relationship (except with *ROE*) with *ROA*, *PROF*, and *ROE* mainly at 5% level.

Table 2: Correlation Analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) ROA	1.000												
(2) ROE	0.559***	1.000											
(3) PROF	0.836***	0.669***	1.000										
(4) DFL	-0.049	-0.001	-0.027	1.000									
(5) BMR	-0.358***	-0.102	-0.215***	-0.027	1.000								
(6) GEAR	-0.366***	-0.386***	-0.390***	-0.064	0.113*	1.000							
(7) AGE	0.176***	0.097	0.081	0.015	-0.295***	0.026	1.000						
(8) CASH	0.328***	0.076	0.135**	0.049	-0.163**	-0.043	0.158**	1.000					
(9) DIR	0.001	-0.001	0.023	-0.010	-0.066	-0.045	-0.018	0.030	1.000				
(10) LEV	-0.533***	-0.186***	-0.478***	-0.144**	-0.068	0.505***	-0.226***	-0.289***	-0.001	1.000			
(11) SIZE	0.135**	0.085	0.234***	0.016	-0.028	0.035	0.143**	0.144**	0.069	-0.067	1.000		
(12) TANG	0.294***	0.081	0.150**	0.023	-0.454***	0.072	0.394***	0.247***	0.126*	-0.121*	0.112	1.000	
(13) TURN	-0.107	-0.025	-0.047	-0.002	0.649***	-0.106	-0.090	0.037	0.021	-0.187***	0.257***	-0.335***	1.000

Note: ***p <0.01, ** p <0.05 and * p <0.1.

There is a positive and non-significant relationship between *DIR*, *ROA*, and *PROF*, but a negative association between *DIR* and *ROE*. However, LEV has a negative and significant nexus with firms' financial performance (*ROA*, *ROE*, and *PROF*) at 1% level whereas *TURN* has a negative but non-significant association with financial performance.

4.3. Results of the Regression Analyzes

This section presents the results of the estimation of the different models described in the Methodology section. Table 3 shows the results of market risk effects on the return of assets of non-financial firms listed on the Casablanca Stock Exchange from 2000 to 2016.

We used the pooled OLS model, the fixed effects model, and the random effects model to estimate the model (1). The results show that the *DFL*, *BMR*, and *GEAR* have a negative and significant effect on the ROA of firms at 5%, 1%, and 10%, respectively according to the pooled OLS model. The effect of market risk on firms' performance is higher with *BMR* compared with the other proxies *DFL* and *GEAR*.

Table 3: The Effect of Market Risk on Return on Assets (Model (1))

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Variables	POLS (robust)	FE	RE	FE (robust)	RE (robust)
DFL	-0.296** (0.130)	-0.203** (0.096)	-0.262*** (0.092)		-0.262** (0.121)
BMR	-4.672*** (0.798)	-2.951*** (1.053)	-3.888*** (0.862)		-3.888*** (1.241)
GEAR	-0.017* (0.009)	-0.008 (0.006)	-0.012** (0.005)		-0.012 (0.007)
AGE	-0.033* (0.018)	-0.223 (0.136)	-0.028 (0.031)		-0.028 (0.029)
CASH	0.627** (0.294)	1.006** (0.412)	0.691** (0.340)		0.691*** (0.249)
DIR	-0.001*** (0.0002)	0.0002 (0.0007)	-0.0002 (0.0007)		-0.0002 (0.0001)
LEV	-9.228*** (1.400)	-10.929*** (2.306)	-10.204*** (1.495)		-10.204*** (2.560)
SIZE	0.441* (0.260)	2.584 (1.829)	0.617 (0.505)		0.617 (0.503)
TANG	0.552 (0.346)	1.469 (0.945)	0.536 (0.483)		0.536 (0.658)
TURN	0.015 (0.013)	-0.0006 (0.028)	-0.001 (0.020)		-0.001 (0.013)
Constant	6.070* (3.591)	-11.290 (22.001)	2.552 (6.778)		2.552 (6.564)
Observations	214	214	214		214
R-squared	0.520	0.261	0.512		0.512
F-stat./Wald chi2(10)	22.720***	8.510***	127.140***	[9.400]	141.840***
W_{MR}	14.400***	-	-	-	17.000***

Note: see Table A.1 for the definition of variables in Appendices. *POLS*, *FE* and *RE* denote pooled OLS, fixed effects model and random effects model respectively whereas *Robust* indicates that we use robust standard errors corrected for autocorrelation and heteroscedasticity problems. W_{MR} is the Wald test examining whether the market risk proxies, i.e. *DFL*, *BMR*, and *GEAR* jointly influence ROA significantly. The numbers in parentheses and brackets are the standard errors and the statistics of Hausman tests. ***p <0.01, ** p <0.05 and * p <0.1.

For instance, a 1% increase in the degree of financial leverage (*DFL*) (respectively in the gearing ratio (*GEAR*)) significantly reduced the *ROA* by approximately 0.29% (respectively by 0.01%), whereas a similar increase in the book-to-market ratio (undervalued firms) significantly decreased the firms' return on assets by around 4.67%.

The variables *CASH*, *SIZE*, *TANG* and *TURN* have a positive influence on the *ROA*, but *AGE* and *LEV* have adverse and significant effects on the *ROA* at 10% and 1% respectively. The Hausman test statistic is non-significant and equals 9.400. Accordingly, the random effects model has been selected and corrected for autocorrelation and heteroscedasticity by using robust standard errors for further investigation.

The findings corroborate the results of the Pooled OLS, that is, *DFL*, *BMR*, and *GEAR* have adverse effects on the *ROA*. The Wald tests suggest that *DFL*, *BMR*, and *GEAR* jointly have a significant effect on the *ROA* at 1% level. Furthermore, Table 4 summarizes the analysis of the relationship between market risk and return on equity.

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Table 4: The Effect of Market Risk on Return on Equity (Model (2))

Variables	POLS (robust)		FE		RE		FE (robust)	RE (robust)	
DFL	-0.291	(0.445)	0.079	(0.694)	-0.291	(0.619)		-0.291	(0.411)
BMR	-6.125	(4.030)	-5.913	(7.539)	-6.125	(4.867)		-6.125	(3.962)
GEAR	-0.190	(0.186)	-0.117**	(0.044)	-0.190***	(0.005)		-0.190	(0.130)
AGE	0.084	(0.135)	0.232	(0.977)	0.084	(0.108)		0.084	(0.111)
CASH	0.705	(1.082)	2.598	(2.955)	0.705	(1.927)		0.705	(1.262)
DIR	-0.003*	(0.001)	0.001	(0.005)	-0.003	(0.005)		-0.003***	(0.001)
LEV	5.255	(12.178)	-14.545	(16.510)	5.255	(8.064)		5.255	(10.118)
SIZE	2.326	(1.613)	13.610		2.326	(1.873)		2.326	(1.492)
TANG	0.961	(1.123)	(13.099)		0.961	(2.048)		0.961	(1.787)
			1.854	(6.770)					
TURN	0.010	(0.054)	-0.012	(0.201)	0.010	(0.102)		0.010	(0.061)
Constant	7.618	(15.953)	-145.962		7.618	(26.383)		7.618	(17.095)
			(157.518)						
Observations	214		214		214			214	
R-squared	0.188		0.086		0.188			0.188	
F-stat./Wald chi2(10)	9.620***		1.250		47.050***		[11.870]	102.170***	
W_{MR}	7.820***		-		-		-	17.970***	

Note: see Table 3. The numbers in parentheses and brackets are the standard errors and the statistics of Hausman tests. ***p <0.01, ** p <0.05 and * p <0.1.

As with previous results, *DFL, BMR,* and *GEAR* reduced the return on equity of the companies but non-significantly over the sample period. In contrast with Table 4, we find that only the *DIR* has a significant negative influence on the *ROE* following the results of the pooled OLS and the random effects model (selected from the Hausman test) after correcting for autocorrelation and heteroscedasticity by robust standard errors. The other control variables have a positive but non-significant effect on *ROE*. The Wald tests show that the overall effect of market risk variables on ROE is significant at 1% level.

Table 5 describes the relationship between market risk and firms' profit margin (*PROF*). The results show that *DFL, BMR,* and *GEAR* have a negative influence on *PROF*. Thus, the profit margin of the companies decreased by about 0.31% (0.02%) in the wake of a 1% increase in the degree of financial leverage (the gearing ratio) whereas this decrease is close to 4.40% after a 1 % increase in the book-to-market ratio following the pooled OLS' results. The random effect model (robust) selected in the Hausman test validates the negative effect of market risk on the

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profit margin. Both models provide similar results except for the mixed results regarding *CASH* and *DIR*.

Table 5: The Effect of Market Risk on Profit Margin (Model (3))

Variables	POLS (robust)	FE	RE	FE (robust)	RE (robust)
DFL	-0.318* (0.186)	-0.342** (0.137)	-0.349*** (0.132)		-0.349 (0.231)
BMR	-4.409*** (1.182)	-2.896* (1.497)	-3.604*** (1.267)		-3.604* (1.860)
GEAR	-0.028 (0.024)	-0.019** (0.008)	-0.023*** (0.008)		-0.023 (0.017)
AGE	-0.056* (0.029)	-0.113 (0.194)	-0.032 (0.054)		-0.032 (0.054)
CASH	-0.480 (0.451)	1.002* (0.586)	0.394 (0.503)		0.394 (0.503)
DIR	-0.0006 (0.0003)	0.0003 (0.001)	0.000 (0.001)		0.000 (0.0002)
LEV	-12.571*** (2.576)	-13.179*** (3.278)	-12.578*** (2.254)		-12.578*** (3.469)
SIZE	1.931*** (0.476)	4.719* (2.601)	2.337*** (0.876)		2.337** (0.969)
TANG	0.128 (0.492)	1.667 (1.344)	0.377 (0.779)		0.377 (0.975)
TURN	-0.009 (0.019)	-0.008 (0.039)	-0.020 (0.030)		-0.020 (0.019)
Constant	-15.388** (15.953)	-40.544 (31.280)	-18.007 (11.577)		-18.007 (11.124)
Observations	214	214	214		214
R-squared	0.402	0.297	0.380		0.380
F-stat./Wald chi2(10)	12.500***	5.520	82.280***	[7.460]	51.670***
W_{MR}	7.140***	-	-	-	9.490**

Note: Note: see Table 3. The numbers in parentheses and brackets are the standard errors and the statistics of Hausman tests. ***p <0.01, ** p <0.05 and * p <0.1.

Besides, Table 5 suggests that the book-to-market ratio (BMR) and leverage (*LEV*) have a negative and significant effect on profit margin while firm size has a positive and significant influence on firms' profit margin. Overall, the market risk indicators (*DFL, BMR,* and *GEAR*) jointly and significantly affect the profit margin at the 5% level.

4.4. Additional Robustness Analyzes

The robustness tests presented in this section relate to the additional analysis of market risk effects on firms' performance using two alternative estimators: the difference GMM and the system GMM following the models (4), (5) and (6). Table 6 presents the results of the effect of market risk on the return on assets of the firms. The system GMM indicates that the *DFL, BMR,* and *GEAR* have a significant negative influence on the *ROA* with a few mixed results from the

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difference GMM. The Wald tests of the system GMM show that the *DFL*, *BMR*, and *GEAR* simultaneously exert a negative and significant effect on the *ROA*. Furthermore, we find that *BMR* and *GEAR* have negative effects on the return on equity in the difference GMM and system GMM as shown in Table 7. This negative effect is significant and higher with *BMR* whereas there are mixed results for *DFL*, *AGE*, *DIR*, *LEV*, and *SIZE*. Nevertheless, the Wald tests reveal a significant overall effect of market risk variables (*DFL*, *BMR*, and *GEAR*) on firms' return on equity (*ROE*).

Table 6: The Effect of Market Risk on Return on Assets (Model (4))

Variables	Difference GMM (robust)		System GMM (robust)	
L.ROA	0.352**	(0.136)	0.607***	(0.096)
DFL	-0.075	(0.240)	-0.359***	(0.069)
BMR	-1.867**	(0.782)	-1.913***	(0.541)
GEAR	0.004	(0.007)	-0.002	(0.003)
AGE	-0.096	(0.154)	-0.016	(0.011)
CASH	0.455**	(0.196)	0.234	(0.188)
DIR	0.000	(0.0002)	-0.0007***	(0.0001)
LEV	-13.559**	(4.877)	-5.263***	(1.385)
SIZE	3.197	(2.149)	0.023	(0.228)
TANG	0.178	(0.922)	-0.201	(0.270)
TURN	-0.018*	(0.009)	-0.0005	(0.007)
Constant	-		2.123	(2.853)
F-stat.	15.310***	[0.000]	87.660***	[0.000]
Arellano-Bond. AR(2)	0.180	[0.858]	0.400	[0.688]
Sargan stat.	182.150*	[0.091]	187.360	[0.659]
W_{MR}	2.020	[0.137]	18.970***	[0.000]

Note: *GMM* denotes the generalized method of moments whereas *Robust* indicates that we use robust standard errors corrected for autocorrelation and heteroscedasticity problems. We employed one-step difference GMM as well as one-step system GMM. W_{MR} is the Wald test examining whether the market risk proxies, i.e. *DFL*, *BMR*, and *GEAR* jointly influence ROA significantly. The numbers in parentheses and brackets are the standard errors and the P.values, respectively. ***p <0.01, ** p <0.05 and * p <0.1.

Table 8 reports the results of the market risk effect on the profit margin by estimating the model (6). As with previous results, an upward trend in BMR and GEAR is reducing corporate profit margins. This adverse effect is more significant with *BMR* than the other market risk variables.

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There results for *DFL*, *AGE*, *DIR*, *LEV*, and *TURN* are mixed. The Wald tests conclude that *DFL*, *BMR*, and *GEAR* jointly have a significant effect on firms' profit margin (*ROA*).

Table 7: The effect of Market Risk on Return on Equity (Model (5))

Variables	Difference GMM (robust)		System GMM (robust)	
L.ROE	-0.404**	(0.171)	-0.220	(0.262)
DFL	1.488**	(0.655)	-0.483***	(0.165)
BMR	-8.383***	(2.645)	-7.527**	(3.531)
GEAR	-0.235	(0.269)	-0.243	(0.220)
AGE	-0.095	(1.199)	0.097	(0.144)
CASH	2.378	(1.476)	0.773	(1.391)
DIR	0.002**	(0.0009)	-0.003*	(0.002)
LEV	-6.128	(22.236)	7.838	(15.394)
SIZE	-3.254	(13.216)	2.828	(2.084)
TANG	6.419	(6.774)	1.443	(2.484)
TURN	0.043	(0.063)	0.019	(0.062)
Constant	-		11.975	(19.208)
F-stat.	271.200***	[0.000]	6.530***	[0.000]
Arellano-Bond. AR(2)	-1.040	[0.300]	-0.720	[0.472]
Sargan stat.	175.290	[0.164]	199.290	[0.421]
W_{MR}	9.690***	[0.000]	4.440**	[0.012]

Note: see Table 6. W_{MR} is the Wald test examining whether the market risk proxies, i.e. *DFL*, *BMR* and *GEAR* jointly influence ROE significantly. The numbers in parentheses and brackets are the standard errors and the P.values respectively. ***p <0.01, ** p <0.05 and * p <0.1.

Overall, most results showed that the degree of financial leverage, the book-to-market ratio, and the gearing ratio had a significant opposite effect on the performance of non-financial firms listed on the Casablanca Stock Exchange (CSE) during the period 2000-2016. The results of a significant negative effect of the degree of financial leverage on financial performance are in accordance with those of Gatsi et al. (2013) and Muriithi et al. (2016), while the results of the book-to-market ratio and the gearing ratio are similar to previous studies by Cakici and Topyan (2014) and Enekwe et al. (2014), respectively. The results reveal that non-financial firms listed in the CSE were heavily indebted and the increasing use of debt financing strategies reduced their profitability because of the burden of interest payments, thus crowding out productive investments.

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Table 8: The Effect of Market Risks on Profit Margin (Model (6))

Variables	Difference GMM (robust)		System GMM (robust)	
L.PROF	-0.059	(0.193)	-0.291	(0.445)
DFL	0.353	(0.466)	-6.125	(4.030)
BMR	-2.934**	(1.248)	-0.190	(0.186)
GEAR	-0.016	(0.026)	-0.190	(0.186)
AGE	-0.165	(0.260)	0.084	(0.135)
CASH	0.804**	(0.365)	0.705	(1.082)
DIR	0.0007**	(0.0003)	-0.003*	(0.001)
LEV	-17.298***	(5.364)	5.255	(12.178)
SIZE	4.368**	(1.937)	2.326	(1.613)
TANG	1.773	(1.498)	0.961	(1.123)
TURN	-0.016	(0.013)	0.010	(0.054)
Constant	-		7.618	(15.953)
F-stat.	8.050***	[0.000]	35.310***	[0.000]
Arellano-Bond. AR(2)	-0.900	[0.370]	1.160	[0.245]
Sargan stat.	173.710	[0.186]	178.560	[0.809]
W_{MR}	2.790*	[0.062]	9.460***	[0.000]

Note: see Table 6. W_{MR} is the Wald test examining whether the market risk proxies, i.e. *DFL*, *BMR* and *GEAR* jointly influence PROF significantly. The numbers in parentheses and brackets are the standard errors and the P.values respectively. ***p <0.01, ** p <0.05 and * p <0.1.

Therefore, the managers of these companies must be attentive to the optimal level of debts to finance productive investments. Besides, the overvaluation of these firms during the period 2000-2016 also led to a decline in their financial performance. The results show that the shares of these companies were very expensive in the market compared to their book value. Companies are growth stocks with certain expectations of future capital gains that may not be possible in adverse market conditions. The significance of the Wald tests indicates that market risk has a significant and negative effect on the return on assets, the return on equity and the profit margin of these companies, respectively. Thus, our hypotheses (H_1), (H_2) and (H_3) have been verified, and the results are in line with those of Gatsi et al. (2013) and Muriithi et al. (2016), among others. On average, the results of the various models suggest that the firms' size, the tangibility ratio, and the cash holdings ratio have a positive effect on the performance of the companies in conformity with Al-Najjar (2014), Ilaboya and Ohiokha (2016), Azadi (2013), Aiyegbusi and Akinlo (2016). However, the age of the companies, the debt-to-income ratio, the

stock turnover and the debt-to-assets ratio have an adverse effect on the performance of these non-financial firms similarly to some previous studies (Raheman and Nasr, 2007; Khan et al., 2016; Pervan et al., 2017; Amraoui et al., 2018).

Our study contributes to the empirical literature by providing new insights into the effects of market risk on the performance of non-financial firms listed in the Moroccan stock exchange. Few studies have considered such a survey in Morocco or elsewhere. Next, we utilized three alternative proxies of financial performance as well as three market risk indicators used in previous studies. Finally, we employed several econometric techniques to validate our results: the pooled OLS model, the fixed effects model, the random effects model, the difference GMM and the system GMM model. Our findings suggest that market risk has a significant negative effect on companies' financial performance.

5. Conclusion and Recommendations

This study examined the effect of market risk on the performance of 31 non-financial companies listed on the Casablanca Stock Exchange (CSE) over the period 2000-2016. We utilized three alternative variables widely used in previous studies to assess financial performance: return on assets, return on equity and profit margin. Besides, we used the degree of financial leverage, the book-to-market ratio, and the gearing ratio as market risk variables following earlier empirical studies. We then added seven control variables, such as the firm age, the cash holdings ratio, the debt-to-income ratio, the debt-to-assets ratio, the firm size, the tangibility ratio, and the stock turnover. First, we employed the pooled ordinary least squares model (OLS), the fixed effects model and the random effects model corrected for autocorrelation and heteroscedasticity with robust standard errors.

Overall, the results showed that the market risk indicators jointly had a significant adverse effect on the companies' financial performance, namely the return on assets, the return on equity and the profit margin, respectively. The book-to-market ratio was the market risk indicator which had a greater and significant effect on the profitability of the companies, followed by the degree of financial leverage. Second, we performed additional robustness analyzes by using the difference GMM and the system GMM which corroborated our findings, although the elasticities differed slightly from the previous results. These findings validated our three hypotheses that market risk has a significant effect on the return on assets (*hypothesis 1, H_1*), the return on equity (*hypothesis 2, H_2*) and the profit margin (*hypothesis 3, H_3*) of non-financial firms listed on the CSE, respectively. These findings are consistent with previous empirical studies by Gatsi et al. (2013) and Muriithi et al. (2016), among others. Most of the results of the different models suggested that the firm size, the tangibility ratio, and the cash holdings ratio had a positive effect on firm performance, whereas firm age, debt-to-income ratio, stock turnover and leverage had a negative effect on the performance of these non-

financial firms. Therefore, decision-makers and managers of these companies should mitigate market risk by using appropriate risk management strategies through derivatives, forwards, futures, swaps, options, and insurance as well as securitization techniques. Future research could investigate the effects of other types of risks on financial performance by using several countries and an extended sample period. Finally, various econometric procedures such as cointegration and causality analysis could be used to assess the relationship between risk management and financial performance better.

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Appendices:

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Table A.1: Description of variables

Note: Data of *ROA, ROE, PROF, GEAR,* and *TURN* were readily available from Orbis and Osiris databases.

Variables	Symbol	Definition	Formula	Expected sign
Dependent variable				
Return on assets	*ROA*	The ratio of a company's net income to the average of its total assets.	$ROA = \frac{Net\ \ income}{average\ \ of\ \ total\ \ assets}$	+
Return on Equity	*ROE*	It is the ratio of the firm's net income to the average of its shareholders' equity.	$ROE = \frac{Net\ \ income}{average\ \ of\ \ total\ \ equity}$	+
Profit margin	*PROF*	Amount of net income (profits) earned with each dollar of sales realized.	$PROF = \frac{Net\ \ income}{Net\ \ sales}$	+
Independent variables				
Market risk				
Degree of financial leverage	*DFL*	The ratio of earnings before interest and taxes (EBIT) to earnings before taxes	$DFL = \frac{EBIT}{(EBIT - Interest\ \ \exp enses)}$	-
Book to market ratio	*BMR*	The book-to-market ratio is used to find the value of a company by comparing the book value of a firm to its market value.	$BMR = \frac{Book\ \ value}{Market\ \ value}$	+/-
Gearing ratio	*GEAR*	It indicates a financial ratio that compares borrowed funds to owner's equity.	$GEAR = \frac{Total\ \ debts}{Equity}$	+/-
Control variables				
Firm Age	*AGE*	Difference between the last year of the study period and the firm's year of establishment	$AGE = Year_t - Establishment\ \ date$	+/-
Cash holdings ratio	*CASH*	The natural logarithm of CASHR and CASHR equivalents divided by total assets	$CASH = Ln(\frac{Cash\ \ and\ \ cash\ \ equivalents}{Total\ \ assets})$	+/-
Debts to income ratio	*DIR*	The ratio of debts to income	$DIR = \frac{Debts}{Income}$	-
Debt-to-assets ratio	*LEV*	The natural logarithm of total debts divided by total assets	$LEV = Ln(\frac{Total\ \ debts}{Total\ \ assets})$	-
Firm size	*SIZE*	The natural logarithm of total assets	$SIZE = Ln(Total\ \ assets)$	+/-
Tangibility ratio	*TANG*	The natural logarithm of tangible fixed assets divided by total assets	$TANG = Ln(\frac{Fixed\ \ assets}{Total\ \ assets})$	+
Turnover	*TURN*	Stock turnover	$TURN = \frac{Cost\ \ of\ \ sales}{Average\ \ stock}$	+/-

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Table A.2: List of selected Non-financial Companies listed in Morocco

NUMBER	COMPANY NAME	ESTABLISHMENT (YEAR)	LISTING (YEAR)
01	DOUJA PROMOTION GROUPE ADDOHA SA	1988	2006
02	LYONNAISE DES EAUX DE CASABLANCA SA	1995	2005
03	CENTRALE DANONE SA	1959	1974
04	LABEL VIE S.A	1985	2008
05	SOCIETE ALUMINIUM DU MAROC SA	1976	1998
06	CARTIER SAADA SA	1947	2006
07	IB MAROC.COM SA	1994	2001
08	SOCIETE MAGHREBINE DE MONETIQUE SA	1983	2011
09	STOKVIS NORD-AFRIQUE SA	1950	2007
10	MICRODATA S.A	1991	2007
11	HIGH TECH PAYMENT SYSTEMS S A	1995	2006
12	FENIE BROSSETTE SA	1962	2006
13	DARI COUSPATE	1994	2005
14	COLORADO SA	1957	2006
15	COMPAGNIE DE TRANSPORTS AU MAROC	1919	1993
16	DELATTRE LEVIVIER MAROC SA	1959	2008
17	SOCIETE DE REALISATIONS MECANIQUES SA	1949	2006
18	MAGHREB OXYGENE SA	1977	1999
19	INVOLYS SA	1986	2006
20	STROC INDUSTRIE SA	1989	2008
21	SOCIETE NATIONALE D ELECTROLYSE ET DE PETROCHIMIE SA	1973	2007
22	SOCIETE DES BRASSERIES DU MAROC	1919	2002
23	DELTA HOLDING SA	1999	2008
24	SOCIETE NATIONALE DE SIDERURGIE S.A.	1984	1996
25	SOCIETE LESIEUR CRISTAL SA	1940	1972
26	SOCIETE AUTO-HALL	1920	1941
27	MANAGEM SA	1930	2007
28	LAFARGEHOLCIM MAROC SA	1981	1997
29	SOCIETE LES CIMENTS DU MAROC SA	1957	1969
30	SOCIETE ANONYME MAROCAINE DE L'INDUSTRIE DU RAFFINAGE	1959	1996
31	MAROC TELECOM	1998	2004

Note: By authors using the Orbis and Osiris databases of companies' financial statements.