The Effect of Leverage on Earnings Management in the Algerian Companies

أثر الاستدانة على إدارة الأرباح في المؤسسات الاقتصادية الجزائرية

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Abstract:

This paper aims to explore whether leverage affects or not earnings management in the Algerian companies. For that, we employed the descriptive approach, through collecting the financial statements of 14 Algerian companies during 2006-2018 and using a multiple linear regression model and panel data to test the hypotheses. According to the results, leverage ratios do not affect earnings management in Algerian companies. However, the debts cost affect positively earnings management in the Algerian companies.

Keywords: Earnings management; Leverage; Debt cost; Algerian companies.
JEL classification code : M40, M41

ملخص:

يهدف هذا المقال إلى استكشاف فيما إذا كان مستوى الاستدانة يؤثر في مستوى إدارة الأرباح في الشركات الجزائرية، ومن أجل ذلك تم استخدام المنهج الوصفي، من خلال جمع البيانات المالية لـ 14 شركة جزائرية خلال الفترة 2006-2018، واستخدام نموذج الانحدار الخطي المتعدد وبيانات سلسلة زمنية مقطعية لاختبار فرضيات الدراسة. وفقا للنتائج فإن مستوى الاستدانة لا يؤثر في مستوى إدارة الأرباح في الشركات الجزائرية، غير أن تكلفة الاستدانة تؤثر إيجابا في مستوى إدارة الأرباح في الشركات الجزائرية.

الكلمات المفتاحية : إدارة الأرباح؛ مستوى الاستدانة؛ تكلفة الاستدانة؛ الشركات الجزائرية.
تصنيف JEL : M40، M41

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1. Introduction :

Financial statements are the most important channel of financial reporting, and a source of public information about companies, they contribute in reducing the information asymmetry between different related parties of the company. Furthermore, information included in financial statements is a mechanism to support the transparency and extend disclosure, which represents a pillar for corporate governance. However, the rising role of accounting data management within the process of preparing and presenting financial statements has become an obstacle to achieve those objectives and a source of misleading users about the performance and financial position of the company.

Earnings management is the commonly used technique of accounting data management by managers (Stolowy and Breton, 2003, p. 130), it is widely used to influence the form and content of financial statements, and thus influence the users' perception of the company and affect their decisions. Previous studies have been concerned with many aspects of this phenomenon, especially factors that explain or determine earnings management.

Earnings management is determined by many factors, like financial and economic characteristics of companies, especially those related to financing policy. Leverage is a determinant of the company's solvency and a constraint of future borrowing. As a result, earnings management can be used to make up the financial statements and cover the high level of leverage. Starting from that, our study aims to explore whether leverage affects earnings management in the Algerian companies.

1.1. Problem statement

We asked the question about the effect of leverage on earnings management, where the following questions guided our study:

• Is leverage affects the earnings management in Algerian companies?

• Is debt cost affects the earnings management in Algerian companies?

1.2. Hypotheses

To find answers for our questions, we tested the following null hypotheses at the 5% level of significance:

- **Hypothesis 1:** Leverage ratio does not affect the earnings management level in the Algerian studied companies.
- **Hypothesis 2:** Debt cost does not affect the earnings management level in the Algerian studied companies.

2. Theoretical background :

2.1. Earnings management concept

Schipper (1989) defined earnings management as an intentional intervention by managers in the process of preparation of financial statements in order to achieve self-benefits. According to Degeorge et al. (1999) earnings management is the use of managerial flexibility to influence the reported accounting earnings for various stakeholders. Stolowy and Breton (2003) described earnings management as the use of the available flexibility by managers in terms of accounting selection or operations structuration to change the wealth transfer risks associated with the company, which negatively affects the reliability of the company's performance and its financial position.

Earnings management includes any managers' practice that tends to influence earnings' amounts, based on available accounting flexibility or operational flexibility. Earnings management reflects several accounting procedures and operational decisions adopted by managers when preparing and presenting financial statements of their companies to influence the level of its performance, in order to achieve certain objectives, based on the flexibility contained in accounting standards and the required judgements to apply accounting policies.

Earnings management includes some techniques conducted in accordance with the accounting rules and principles, through the selection of appropriate accounting policies, and the use of estimations

and judgments in the application of those accounting policies, in order to control the level of earnings, what affects the performance of the company and its financial position in terms of form and content.

2.2. Earnings management motivations

The literature has distinguished between two perspectives in terms of earnings management motivations. The first is the "Opportunistic", which assumes that the managers' objective of earnings management is to mislead users, or disclose information in consistence with their expectations about performance and financial position of the company, in order to achieve self-benefits. The second is the "Informational", which assumes that the managers' objective of earnings management is to provide relevant information for users, reduce information asymmetry, and signal financial market about the company's future expected cash flows, in order to affect positively its value.

Based on the "Positive Accounting Theory" of Watts and Zimmerman (1978) and the works about the "Value Relevance" of accounting information (Lev, 1989; Amir et al., 1993; Francis and Schipper, 1999; Barth et al., 2001), earnings management motivations can be classified into three groups:

- **Contractual motivations:** they stem from "Contracts Theory" and "Agency Theory", where contracts between the company and related parties depend on financial statements, so managers seek to provide accounting information in consistence with contractual clauses, in order to increase their incentives, improve their reputation, or comply with debt covenants.
- **Financial market motivations:** these motivations tend to affect stock prices, especially in the lead-up to IPOs and stock offerings. It interested also with the disclosure of earnings in consistence with analysts' forecasts or management estimates, to prevent any significant volatility in stock prices in the short term.

- **Institutional motivations:** they arise as a result of the expected relationship between accounting information and government decisions, what lead managers manipulating earnings in order to reduce income tax payments, protect the company from any potential legislation (Antitrust, Environment protection, Consumer and employee rights, etc.), and thus reducing political costs.

2.3. Earnings management and leverage

Leverage is a classical financial concept that refers to the debt amount comparing with the equity amount that a firm uses to finance its assets. Primarily, leverage refers to the using of borrowed capital as a funding source when investing to expand the firm's asset base and generate returns on risk capital. Leverage is an investment strategy of using borrowed money, specifically, the use of various financial instruments or borrowed capital, to increase the potential return of an investment (Investopedia, 2019).

Leverage is a strategy of financing policy of the company that influences various financial ratios of capital structure and performance, and changes the risk map of the company.

Debt covenants are much related to accounting information, as they often include a set of incentives or restrictive clauses, which are formulated based on accounting information, especially earnings. For that, managers tend to manipulate earnings to disclose accounting information in consistence with those clauses, in order to achieve their benefits depending on the situation.

According to Mard (2005), pressures on managers from lenders and shareholders can motivate earnings management. Moreover, the debt evolution is not only the focus of lenders, but also the focus of all stakeholders, so to reassure these parties about the future of their company, managers of a leveraged company seek to improve its profitability, through earnings management. Therefore, many studies

have adopted the assumption that "the most leveraged companies tend to manage their earnings towards increasing". On the other hand, many studies adopted the inverse assumption that "leverage limits accrual-based earnings management due to the scrutiny of auditors and regulators (Vakilifard and Mortazavi, 2016), which can encourage real earnings management.

3. Literature review :

Yero (2012) assessed the effects of leverage incentive on three known earnings management strategies (accrual, real and deferred tax). The study included 29 Nigerian listed manufacturing firms over 2003-2010; and found that while a significant positive relationship exists between leverage and accrual earnings management, the relationships are in the negative direction for both real and deferred tax strategies.

Ardison et al. (2012) analyzed the relation between leverage ratio and earnings management in Brazil; using a linear regression method with 3725 firm-year observations from 1994 to 2010 of all BMF & Bovespa listed firms. The model of study was controlled using the cost of capital and the natural logarithm of total assets. The results showed that no relations between leverage ratio and earnings management.

Zamri et al. (2013) examined the association between leverage and real earnings management. The study used 3745 firm-year observations over 2006-2011, from the companies listed on Bursa Malaysia. The results showed a significant negative association between leverage and real earnings management suggesting that leveraged firms have lower levels of earnings management.

Shirzad and Haghighi (2015) explored the impact of corporative leverage on earnings management. The sample of the study included 313 firm-year observations from the companies listed on the Tehran Stock Exchange, during the period of 2001-2014. According to the

results, there is a negative and significant association of earnings management with financial leverage.

Starting from the previous studies' conclusion about the role of leverage in limiting accrual-based earnings management, Vakilifard and Mortazavi (2016) examined whether leverage leads to move from accrual-based earnings management to real earnings management, using a sample of 118 firms listed on the Tehran Stock Exchange over 2008-2013. The results indicated that managers tend to engage more in real earnings management than accrual-based earnings management once leverage is increasing.

Shahzad et al. (2017) examined if the choice of real and accrual-based earnings management of family and non-family firms is associated with leverage. The study included 760 firm-year observations for all Pakistani listed companies over 2007-2014. According to the results, leveraged firms are more practice of real earnings management and less practice of accrual base earning management due to its higher litigation risk. Moreover, the impact of leverage on real and accrual earnings management is stronger for family than non-family controlled businesses.

Wijesinghe and Kavinda (2017) analyzed the impact of leverage on real earnings management, using a sample of Sri Lankan listed manufacturing companies, with 600 firm-year quarterly observations during 2010-2015. The results indicated that manufacturing companies are having abnormal cash flows and production costs in their operations, and there is a significant positive impact of leverage on real earnings management in Sri Lankan listed manufacturing companies.

Lazzem and Jilani (2018) examined the impact of leverage on accrual-based earnings management for a sample of French firms indexed in CAC All-Tradable from 2006 to 2012. Consistent with the "Debt covenants hypothesis", the study found that firm leverage has a

positive effect on earnings management for French firms. The empirical results showed that leverage increases provide incentives for managers to manipulate earnings.

Asim and Ismail (2019) examined the impact of leverage on earnings management in the manufacturing sector of Pakistan, using 159 non-financial listed firms over 2009-2015. The findings revealed positive and significant associations of earnings management with leverage and control variables (ROA and firm size), while the association of earnings management with growth was not significant.

Nalarreason et al. (2019) analyzed the effect of leverage and firm size on earnings management, using a sample of 75 Indonesian manufacturing listed companies during 2013-2017. Consistent with "Agency Theory" and "Positive Accounting Theory", leverage and firm size has a positive effect on earnings management for manufacturing companies in Indonesia. The empirical results showed that leverage and firm size encourage managers to manage earnings.

As the earlier studies were carried out in developing economies, our review focused on studies carried out in emerging economies. The review indicated that studies about the relationship between leverage and earnings management have generally used the panel regression and employed the different strategies of earnings management. Even though our study used panel data and employed accrual-based earnings management strategy, it focused on a developing economy like Algeria, which can consider an addition to the literature.

4. Study Methodology :

The study employed a descriptive approach, through the collection of financial statements of 14 Algerian companies, during 2006-2018, to collect data about the variables. The statistical method was used through designing a model as the form of multiple linear regression,

then the correlation and some statistical tests were employed, such as Analysis of variance, and Student test.

4.1. Model

The study model is a multiple linear regression equation, which relates earnings management with explanatory variables.

$$EM_{it} = a_0 + a_1 LEV_{it} + a_2 DC_{it} + \varepsilon_{it} \quad (1)$$

Where: EM_{it} is the earnings management of the company *i* during the period *t*, measured by the discretionary accruals; LEV_{it} is the leverage ratio of the company *i* at the end of the period *t*, measured by the total debts divided on the total equity; DC_{it} is the debt cost of the company *i* during the period *t*, measured by the financial expenses divided on the total debt; a_0 is a constant that measures the earnings management when the leverage and the debt cost take the value zero; a_1 and a_2 are the regression coefficients; ε_{it} is the error term.

4.2. Earnings management measurement

This study employed accrual-based earnings management that measured by the discretionary accruals using the Modified Jones model developed by Dechow et al. (1995) as shown in Equation (2).

$$TAC_{it}/A_{it-1} = \alpha_1(1/A_{it-1}) + \alpha_2[(\Delta REV_{it} - \Delta REC_{it})/A_{it-1}] + \alpha_3(PPE_{it}/A_{it-1}) + e_{it} \quad (2)$$

Where: TAC_{it} is the total accounting accruals; A_{it-1} is the total assets; ΔREV_{it} is the variation of sales; ΔREC_{it} is the variation of customers; PPE_{it} is the property, plant and equipment; α_1, α_2, and α_3 are the regression coefficients; e_{it} is the error term, which measures the unexpectable accounting accruals or discretionary accruals.

- **Calculation of total accruals:** in the first step, we calculated the total accruals for each company in each year depending on Equation (3).

$$TAC_{it} = \Delta WCN_{it} + CP_{it} - DOT_{it} \quad (3)$$

Where: ΔWCN_{it} is the variation of working capital needs during the period; CP_{it} is the non-cash expenses of the period; DOT_{it} is the amortization and impairment expenses of the period.

- **Estimating the parameters of the model of Dechow et al. (1995):** in the second step, we estimated the parameters of the model of Dechow et al. (1995) that shown in Equation (2) using the data of all companies during the period of study (Pooled regression). The results of the estimation summarized in Table 1.

Table 1 : *The estimation results of Dechow et al. (1995).*

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	F	Sig	R^2
	B	Std. Error	Beta					
(Constant)	0.042	0.018		2.29	0.024	6.92	0.000	0.17
A_{it-1}	40463	39374	0.092	1.03	0.306			
$(\Delta REV_{it} - \Delta RECit)/A_{it-1}$	-0.005	0.011	-0.039	-0.44	0.661			
PPE_{it}/A_{it-1}	-0.067	0.016	-0.384	-4.27	0.000			

a. Dependent Variable: TAC_{it}

Source: *Based on SPSS V19.*

- **Estimating the non-discretionary accounting accruals ($NDAC_{it}$):** in the third step, we estimated the non-discretionary accruals depending on Equation (4) and using the estimated parameters of the model of Dechow et al. (1995).

$$NDAC_{it}/A_{it-1} = \alpha_1 (1/A_{it-1}) + \alpha_2 [(\Delta REV_{it} - \Delta REC_{it})/A_{it-1}] + \alpha_3 (PPE_{it}/A_{it-1}) \quad (4)$$

- **Calculation of discretionary accounting accruals (DAC_{it}):** in the fourth step, we used Equation (5) to calculate the discretionary accruals.

$$DAC_{it}/A_{it-1} = TAC_{it}/A_{it-1} - NDAC_{it}/A_{it-1} \quad (5)$$

- **Earnings management index (EM_{it}):** in the last step, we calculated earnings management as shown in Equation (6).

$$EM_{it} = |DAC_{it}| / A_{it} \quad (6)$$

5. Study results :

5.1. The results of descriptive statistic

Table 2 presents the descriptive data of 117 observations related to 14 Algerian companies over 2006-2018. The table shows that the mean of earnings management reached 0.44 with a standard deviation of 3.41, which means that the discretionary accruals represent on average 44% of the total assets of Algerian companies. According to the mean of leverage, debts represent on average 71% of the total assets, which means that Algerian companies are highly leveraged. Finally, Table 2 indicates that the debt cost of Algerian companies reached 8% on average, which justifies the high leverage of companies.

Table 2 : *The descriptive statistic for variables.*

	EM_{it}	LEV_{it}	DC_{it}
Mean	0.44	0.71	0.08
Median	0.01	0.47	0.07
Std. Deviation	0.34	0.76	0.07
Minimum	0.02	0.02	0.01
Maximum	0.62	4.76	0.30
Observations	117	117	117

Source: *Based on SPSS V19.*

5.2. The validity of the model of study for the OLS

The Normality of errors is a required attribute to estimate a regression model using OLS. For that, we employed Kolmogorov-Smirnov and Shapiro-Wilk to test the normality of errors. As shown in Table 3, Kolmogorov-Smirnov and Shapiro-Wilk indicate that the errors arisen from the estimation of the model of study are normally distributed, as the significance levels are more than 5%.

Table 3 : *The normality test of errors.*

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Standardized Residual	0.081	102	0.098	0.984	102	0.275

a. Lilliefors Significance Correction

Source: *Based on SPSS V19.*

In order to examine the Homoscedasticity of errors arisen from the estimation of the model of study, the Goldfield-Quandt test was employed, starting from sorting the data in ascending order according to the dependent variable, then deleting 21 observations in the middle (20%). After that, we estimated the model of study using two different data series, the first included the first 40 observations (40%), and the second included the last 41 observations (40%). Table 4 presents the results of the analysis of variance for each series.

Table 4 : *The ANOVA after the division of data into two series.*

ANOVA[b]

	Model	Sum of Squares	df	Mean Square	F	Sig.
1. The first 40 observations	Regression	4.784	4	1.196	144.604	0.000[a]
	Residual	0.298	36	0.008		
	Total	5.082	40			
	Model	Sum of Squares	df	Mean Square	F	Sig.
2. The last 41 observations	Regression	0.019	4	0.005	1.117	0.363[a]
	Residual	0.161	37	0.004		
	Total	0.181	41			

a. Predictors: (Constant), DC_{it}, LEV_{it}

b. Dependent Variable: EM_{it}

Source: *Based on SPSS V19.*

Starting from Table 4, we calculated the F-value as follows:

$$\mathbf{F = \frac{Sum\ of\ Squares\ Residual\ 2}{Sum\ of\ Squares\ Residual\ 1} = \frac{0.161}{0.298} = 0.543}$$

The calculated F-value that reached 0.543 is less than the F-critical value obtained from the F-table at the degrees of freedom 4 and 40 respectively, and the significance level of 2.5% (2-tailed), which attained 3.13. This means that the errors are homoscedastic.

From Table 6 presented below, it appears that the calculated Durbin-Watson value reached 2.183, and it is less than ($4 - d_u = 2.375$), so the errors are not autocorrelated, knowing that ($d_u = 1.625$) is the upper critical value obtained from Durbin-Watson table at the degrees of freedom 4 and 100 respectively, and the 1% significance level.

Finally, Table 7 shows that the Variance Inflation Coefficients (VIF) of all explanatory variables are weak and do not exceed 1.5. This suggests the absence of a linear correlation between the explanatory variables of the model of study.

The above results indicate the existence of OLS's assumptions to estimate the model (Normality, Homoscedasticity, Autocorrelation, Linear correlation), which suggests the validity of our model.

5.3. Estimation of the model of study

Table 5 summarizes the results of the analysis of variance, which indicates that the model of the study is significant at the 1% level, as the calculated F-value reached 84.128 and it is more than F-critical value obtained from F-table. Therefore, the determination coefficient of the model is significantly different from zero, and at least, one of the regression coefficients is statistically significant and differs from zero. Consequently, the leverage and/or the debt cost affect earnings management in the Algerian companies.

Table 5 : *The ANOVA for the model of study.*

ANOVA[b]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	5.485	4	1.371	84.128	0.000[a]
	Residual	1.581	97	0.016		
	Total	7.065	101			

a. Predictors: (Constant), DC_{it}, LEV_{it}

b. Dependent Variable: EM_{it}

Source: *Based on SPSS V19.*

Table 6 presents the model summary, it confirms the ANOVA results, where the determination coefficient of the model reached 76.7%, which means that 76.7% of the variations in earnings management during the period of the study can be explained by the leverage and/or debt cost, and only 23.3% of the variations in earnings management are due to other factors, including random errors.

Table 6 : *The explanatory power of the model of study.*

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.881[a]	0.776	0.767	0.12766459	2.183

a. Predictors: (Constant), DC_{it}, LEV_{it}

b. Dependent Variable: EM_{it}

Source: *Based on SPSS V19.*

5.4. Hypotheses Testing

Table 7 summarizes the results of the partial significance of the model of study; it shows that the constant is significant at the 1% level, and reached -0.162, so the discretionary accruals are negative and represent 16.2% of the total assets when both the leverage and the debt cost take the value zero.

According to the results, the regression coefficient related to leverage is not statistically significant, because the significance level of

the Student test reached 0.102 and it is more than the hypothetical level of significance 5%, which suggests no statistically significant relationship between earnings management and leverage. As a result, the leverage ratio does not affect earnings management in the Algerian studied companies, which confirms the ***Hypothesis 1***.

The results show that the regression coefficient related to the debt cost is statistically significant at the 1% level, where the calculated T-value is more than the T-value obtained from the T-table. The value of the regression coefficient is positive and reached 0.132, which means that any change of 10% in debt cost leads to a change of 1.32% in earnings management in the same direction. Consequently, the debt cost affects positively the earnings management level in the Algerian studied companies, which differs from the ***Hypothesis 2***.

Table 7 : *The Coefficients regression of the model of study.*

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	*(Constant)*	-0.162	0.046		3.525	0.001		
	LEV_{it}	0.034	0.020	0.096	1.653	0.102	0.686	1.457
	DC_{it}	0.132	0.008	0.856	17.543	0.000	0.969	1.032

a. Dependent Variable: EM_{it}

Source: *Based on SPSS V19.*

6. Conclusion :

Managers have widely used earnings management to manipulate accounting data for the purpose of influencing the financial statements, and thus influencing the users' perception of the company. Earnings management is determined by many factors, like the financial and economic characteristics of companies, especially, those related to financing policy. In this context, this paper explored whether leverage affects or not earnings management in the Algerian companies.

To achieve the aim of this study, we employed the descriptive approach, where financial statements of 14 Algerian companies during

the period of 2006-2018 have collected. We tested the hypotheses using a multiple linear regression model and panel data. The results indicated that the leverage ratio does not affect earnings management in the Algerian companies. However, the debt cost affects positively earnings management in the Algerian companies.

The findings of this study confirm the results of some studies that revealed no relations between leverage ratio and earnings management like Ardison et al. (2012). However, the findings of this study differ from the results of many studies suggesting that leverage has a positive effect on earnings management (Yero, 2012; Wijesinghe and Kavinda, 2017; Lazzem and Jilani, 2018; Asim and Ismail, 2019; Nalarreason et al., 2019). The findings of this study differ also from the results of several studies that revealed a negative effect of leverage on earnings management or that managers tend to engage more in real earnings management than accrual-based earnings management once leverage is increasing (Zamri et al., 2013; Shirzad and Haghighi, 2015; Mortazavi, 2016; Shahzad et al., 2017).

The differences recorded between this study and the most of the previous studies can be explained by the particularities of economic and institutional conditions of each environment and the period of each study, where the debt covenants differ in terms of country and time. Therefore, the managers' tendency towards earnings management will change following these specifiers. The results of this study imply that future studies must explore which debt constraints motivate earnings management and whether other financial characteristics of companies can affect earnings management.

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8. Appendices :

Appendix 1 : *Summary of data used to calculate the total accruals (Mean for each company during the period).*

Companies	ΔINV_i	ΔREC_i	ΔSD_i	CP_i	DOT_i	TAC_i
Air Algérie	447714	53603	2565316	1190629	9037804	-9911175
EL AURASSI	51716	69712	75767	79184	319862	-195017
ENTP	860547	624078	-7010424	548007	8145381	897676
SAIDAL	237468	141963	351236	578237	1069695	-463262
Sonatrach	21573083	197439917	139525750	294738331	273547975	100677606
Sonelgaz	8770310	32379580	32827521	8578367	42766105	-25865369
SPA DAHLI	16048	178254	152995	25531	919334	-852495
ETRHB	1206762	4522618	3609166	1227526	1108066	2239673
ENAFOR	874723	535195	287516	582488	4550193	-2845303
CEVITAL	2348339	4856529	4592604	1430034	1921446	2120852
NCA-Rouiba	53793	116630	171090	71166	224723	-154224
BIOPHARM	669112	2410263	1682348	1332565	1470964	1258628
ALLIANCE	-	1839439	2800061	235619	322049	-206507
HYPROC SC	-16515	940773	879873	127254	1396706	-1225068

ΔINV_i: is the variation in inventories; **ΔREC_i:** is the variation in receivables; **ΔSD_i:** is the variation in short debts; **ΔWCN** = $\Delta INV_i + \Delta REC_i - \Delta SD_i$

Appendix 2 : *Summary of data used to estimate the model of Dechow et al. (1995) (Mean for each company during the period).*

Companies	A_{it}	REV_{it}	REC_{it}	PPE_{it}
Air Algérie	130 262 045	57 617 173	11 605 223	118 679 777
EL AURASSI	8 648 220	1 816 184	537 583	8 391 782
ENTP	51 159 936	23 710 622	5 481 279	54 987 798
SAIDAL	23 383 667	14 635 588	4 970 537	24 227 000
Sonatrach	6 249 890 425	4 601 863 494	373 934 294	4 756 191 489
Sonelgaz	1 484 315 197	157 144 152	90 595 761	1 575 999 386
SPA DAHLI	24 013 362	2 597 899	693 067	28 417 938
ETRHB	28 166 659	20 212 508	11 448 260	12 357 303
ENAFOR	35 756 720	17 629 408	3 610 837	44 609 221
CEVITAL	78 610 161	64 052 687	4 883 804	44 723 074
NCA-Rouiba	3 738 321	4 076 295	688 172	3 229 004
BIOPHARM	42 627 046	58 869 609	16 014 380	5 938 211
ALLIANCE	5 936 062	3 994 018	2 155 294	1 027 281
HYPROC SC	52 873 834	16 876 456	5 292 003	27 853 908

Appendix 3 : *Summary of data used to estimate the model of Dechow et al. (1995) (Mean for companies in each year).*

Years	TAC_{it} / A_{it-1}	$1 / A_{it-1}$	$(\Delta REV_{it} - \Delta REC_{it}) / A_{it-1}$	$PPEit / A_{it-1}$
2003	0.26951	0.0000000680	0.83232	1.25154
2004	-0.03827	0.0000001615	-0.35336	1.11956
2005	-0.01547	0.0000001267	0.05996	1.11018
2006	-0.03071	0.0000001199	0.09282	1.02406
2007	-0.04087	0.0000001156	0.11231	1.28825
2008	-0.04979	0.0000001388	0.08035	1.04215
2009	-0.04635	0.0000001056	0.09573	0.91340
2010	-0.02140	0.0000001122	0.05368	1.00899
2011	-0.02354	0.0000000894	0.02903	0.94744
2012	-0.01330	0.0000000727	0.03789	0.87747
2013	0.00748	0.0000000649	0.02168	0.86696
2014	-0.05560	0.0000000629	0.05540	0.87684
2015	-0.02835	0.0000000840	0.00192	0.71289