Audit Quality, Joint-Auditors and Game Theory: Empirical Validation in the French Context

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Abstract

The objective of our research is to show the role of "game theory" as a scientific discipline permitting better explanation of the nature of complex relationships between the different stakeholders of the company. Motivated by the current discussions on the choice of the composition of the college auditors, we try to study the combination of auditors to ensure a better audit quality; and to demonstrate the gains and losses of the two players in the game studied during the period 2005-2010.

The empirical results reveal that the best audit quality is conditioned by the presence of pair heterogeneous auditors (Big4_Non Big4). Added to that, the audit quality is affected by a high level of audit fees, minimizing the debt ratio, a large reflection of the business performance and financial means to enable it to meet the economic crises that surround it.

Keywords: audit quality, joint auditors, game theory, France

JEL Classification: C72, D74, M4

1. Introduction

The recent crises (now those of governance triggered by the *Enron* case and that of *Subprime* loans beginning in the United States with the first significant shortcomings on the *Subprime* loans) have highlighted numerous dysfunctions of the financial market and governance mechanisms of the publicly-traded companies. To restore investors' confidence, the regulators have intervened by the introduction of some new laws or the revision of a few clauses. In France, the introduction of the financial security law in 2003 is an illustration of this movement. Therefore this French legislation has become one of the most comprehensive laws in Europe which guarantee independence. International regulators are more and more interested in this law and its specificities, mainly the joint-auditor section.

Within the framework of recent financial scandals, the independence of the auditor has become the center of many debates. In fact, these studies primarily seek to clarify the processes to minimize the risk of non-detection of errors or fraud in the financial accounts of the customers. Similarly, the accounting scandals have opened a debate among academics, regulators and the accounting profession on the way of restoring the confidence of the public regarding the financial information disclosed by the companies and therefore a better audit quality.

Our study will be organized as follows: The second section is committed to presenting a synthesis of the literature and the development of our assumptions. In the third section, we are to clarify the research methodology adopted. The fourth section will present the results of the econometric analysis. Finally, the fifth section will be reserved for our conclusions.

2. Literature Review and Research Hypotheses

Many researchers have studied the effectiveness of the joint auditors in France (Ben Ali, 2013; Marmousez, 2012). Based on the simple game theory, we are trying to study the relationship between the audit quality and the joint auditors and to provide evidence that the combination of auditors Big4/Non-Big4, allows to ensure and generate a better quality of disclosed information, or a better audit quality.

2.1 Simple Game between Joint Auditors

The strategic interactions between the two auditors for the evaluation and the judgment of the quality of financial

statements remain of considerable importance. In this sense, the relationship between the joint auditors and the quality of financial states remains more complex than the fact that two Big4 are better than a single one, which is itself better than nothing at all (Marmousez, 2012). Moreover, as the law on the French security requires that each auditor verifies the work undertaken by the other independent auditor leading to the joint-auditor report, the joint declaration of verification may be regarded as the result of a non-cooperative game between the two auditors.

Game theory has been used to describe the relationships between the firm and its unique auditor. In this sense, different strategic relationships have been analyzed in a set of cooperative games (Hatherly et al., 1996). Demski and Swieringa (1974) argued that the tariff structure is agreed on between the auditor and the company, and that they share the potential costs. Hatherly et al., (1996) require that the two parties (auditor/auditee) can either reach agreements based on cooperation on the audit process to be implemented throughout the verification procedure, or not cooperate at all.

2.1.1 Two Player's Game with a Homogeneous Pair of Auditors

We hypothesize that the joint auditors (in this case, two auditors of type Big4 or two auditors of type Non-Big4) have the choice between two different strategies: either take *"Corrective Measures"* to increase the level of disclosure of information or take *"No Action"*. In addition, we suppose that during an audit mission:

The two auditors can take *"Corrective Measures"* for the improvement of the level of disclosure of information on the part of the audience. This strategy generates costs (C_{CM}) for the two auditors. Furthermore, the two auditors bear in equal shares ($1/2 * C_{CM}$) the full costs if they decide to take corrective measures and the costs of "*No Action*" will be set to zero. By contrast, if one of the two auditors decides only to take corrective measures, he supports only the full costs C_{CM} (Paugam & Casta 2012).

Thus, the information disclosure will be "low" if the auditors did take *"No Action"*. At any time, the choice of a single auditor to take *"Corrective Measures"* is sufficient to improve a *"high"* level of disclosure of information and which constitutes the social optimum (Paugam & Casta 2012).

Table 1. Strategies of auditors and the level of disclosure of information

		Auditor1	
		Corrective Measures	*No Action*
Auditor 2	*Corrective Measures*	High disclosure [(*)]	High disclosure [(*)]
	No Action	High disclosure [(*)]	Low disclosure

The best results are indicated with a star (*).

Finally, we have a low level of information disclosure in case the auditors take *"No Action"*. The adoption of this strategy generates costs of reputation (C_{REP}) and the two auditors bear in equal shares ($1/2 * C_{REP}$) all of the costs.

The results of the game in the presence of two auditors of the same type can be summarized in the following table.

Table 2. Result of the game with two auditors of the same type

		Auditor 1	
		Corrective Measures	*No Action*
Auditor 2	*Corrective Measures*	$(-1/2*C_{CM} ; -1/2*C_{CM})$	$(0 ; -C_{CM})$
	No Action	$(-C_{CM} ; 0)$	$(-1/2*C_{REP} ; -1/2*C_{REP})$

Table 2 describes the earnings of different actors (C_{CM} = Costs of corrective measures; C_{REP} = Costs of reputation in case of a low disclosure of information, *"No Action"*).

In this case the Nash equilibrium depends on the value of the cost when the auditors decide to take *"Corrective Measures"* compared to the value of the costs generated if the two auditors decide to take *"No Action"* (Paugam

& Casta 2012).

Lemma 1

If 1/2 * C_{REP} < C_{CM}, in this situation the solution of Nash balance is given when both auditors at one and the sometime do not take corrective measures similar to the solution of the prisoner's dilemma.

Evidence

If the first auditor (N°1) chooses to take as strategy: *"No Action"*.

This strategy dominates when:

The second auditor (N°2) chooses to take as a strategy *"Corrective Measures"*, because -1/2 * C_{CM} <0.

Similarly, this strategy will dominate when:

The second auditor (N°2) chooses to take *"No Action"*, the fact that 1/2 * C_{REP} < C_{CM} by assumption.

The same reasoning applies to the other player.

The significance of this result is similar to that of the game of prisoner's dilemma. In fact, the adoption of a strategy generates very low costs of reputation, either because they are low in absolute terms or because they are borne in equal shares by the two auditors, the auditors choose as a strategy to take *"No Action"* and therefore the level of disclosed information expected by the public will be too low. Therefore, we make the following assumption:

H1: *The audit quality produced by a homogeneous pair of auditors (Big4_Big4) / (Non-Big4_ Non-Big4) is lower than that produced by a heterogeneous pair.*

2.2.2 Two Player's Game with a Heterogeneous Pair of Auditors

In what follows, the game will have two players of different types: a Big 4 auditor and a Non Big 4.

Because of the economies of scale and of human capital, the costs generated by the choice of taking *"Corrective Measures"* to achieve the same level of disclosure for the Non-Big4 are more important than for the Big4 so that:

$$C_{CM}^{NB4} = K * C_{CM} \quad \text{(with k > 1) (Note 1)}$$

In the case of a linear relationship between the costs incurred by the auditors of type Non-Big4 and the costs borne by the auditors of type Big4, if the two auditors choose to take *"Corrective Measures"* as a strategy, the costs are reduced for Big4 auditors 1/2 * C_{CM}, and to k/2 * C_{CM} for the Non-Big4 auditors. By contrast, in the case of a company with a low level of disclosure of information, the costs of reputation are higher for an auditor of type Big4 than for an auditor of type Non-Big4 because they have "nothing to lose" (DeAngelo, 1981).

The results of the game in the presence of two auditors of different types can be summarized in the table 3.

Table 3. Game of two players with a heterogeneous pair of auditors

		BIG 4	
		Corrective Measures	*No Action*
NON BIG 4	*Corrective Measures*	(-1/2*C_{CM} ; -k/2*C_{CM})	(0 ; -k*C_{CM})
	No Action	(-C_{CM} ; 0)	(-C_{REP} ; 0)

Table 3 describes the gains of the different actors (C_{CM} = Costs of corrective measures; C_{REP} = Costs of reputation in case of a low disclosure of information, *"No Action"*).

As we have already mentioned in the previous case, the balanced solution of Nash for this game in the presence of a heterogeneous pair of auditors will depend on the relative value of the costs when auditors decide to take corrective measures in relation to the costs of reputation caused by a low level of disclosure of information.

Lemma 2

If C_{REP} > C_{CM} then in this case the solution of the balance of Nash is given when the auditor of type Big4 chooses to take *"Corrective Measures"*, and the auditor of type Non-Big4 chooses to take *"No Action"*.

Evidence

If the auditor of type Non-Big4 chooses to take as a strategy: *"No Action"*, this strategy strictly dominates the one chosen by the auditor of type Big4, because -K * C_{CM} < -K / 2 * C_{CM} < 0. In addition, taking into account the strategy chosen by the auditor of type Non-Big4, the choice of the auditor of type Big4 to take *"Corrective Measures"* dominates the choice of *"No Action"* if and only if C_{REP} > C_{CM}.

In other words, the auditors of type Non-Big4 will bear cheaper costs of reputation (which means in this case the choice to take *"No Action"*), as opposed to higher costs and therefore implement the choice to take *"Corrective Measures"* as a strategy. Indeed, a Non-Big4 auditor has no incentive to take the choice of *"Corrective Measures"*. Thus, the choice of *"No Action"* and as such strategy strictly dominates the other one. The choice of auditor of type Non-Big4 plays the role of a temporary profiteer of the situation. Given the choice of the auditor of type Non-Big4, the auditor of type Big4 doesn't choose to take *"Corrective Measures"* unless the costs of reputation associated with a low level of disclosure of information exceeds the costs to take only one of the *"Corrective Measures"*. Accordingly, we are making the following hypothesis:

H2: *The audit quality produced by a heterogeneous pair of auditors (Big4 / Non-Big4) is much better than that produced by a homogeneous pair.*

2.2 The Auditors' Fees

There are multiple reviews of the literature on auditors' fees. Indeed, within the framework of the statutory auditors, the latter's job is to certify the accounts of the company. When the companies publish consolidated accounts, the tasks are distributed in a concerted manner between the joint auditors .The magnitude of this work depends on the amount of auditors' fees (Géraldine Broye, 2009). According to Malone and Robert (1996), the fees charged by the auditor have been identified by the literature as a factor influencing the independence of the auditor and, consequently, the audit quality. Additionally, some researchers have tested if the pressure exerted on the amount of the fees has an influence on the audit quality. They support the hypothesis that if the audit firm earns very low fees, its profitability can only be restored by reducing the number of working hours, which will affect the ability of auditors to detect errors in the financial statements (David et al., 2006).

H3: *Audit fees have a significant and positive impact on the audit quality.*

2.3 The Indebtedness of Enterprises

According to understanding of Jensen and Meckling (1976) to the theory of agency, resorting to a governance mechanism such as indebtedness constitutes a solution to conflicts between managers and shareholders. On that account, with the increase of the risk of bankruptcy, such a system of indebtedness encourages the manager, who is threatened by the loss of his benefits in cash or in kind, to adopt a more effective management and more consistent with the interests of shareholders. In this sense, this mechanism provides a means of discipline of leaders which can promote the confidence of the public. Carey et al. (2000) anticipates that the level of indebtedness of enterprises may be a factor influencing the decision to put a societal verification. According to Chow (1982) and also Carey et al. (2000) the theoretical debates with respect to the association between the level of debts of the enterprises and the demand for external audit have a tendency to promote positive association. In the same sense, Balckwell et al. (1998) assume that the demand of the services of external audit results from the need to minimize the superiority of the maintenance of the information between the different stakeholders. As indicated by Carey et al. (2000) the level of indebtedness has a positive impact on demand for the services of the external audit. Following these researches, we propose to test the following hypothesis:

H4: *The debts of enterprises have both negative and significant impacts on the audit quality.*

2.4 The Size of Firm

The various empirical studies, which aim at modeling the audit quality or the fees of external audit, recognize the size of the company being audited as a main explanatory variable. In fact, the theoretical literature shows the link between the size of the company and the audit quality. Moreover, the size is a main source of visibility, the larger a business is, the more it will be observed and subjected to pressure from the public (Cooke, 1992). In this perspective, the firms of large size must behave in a respectful way and give example of the good management of the resources thanks to their visibility and for the maintenance of public confidence (Bewley & Li, 2000).

Other researchers have demonstrated the positive relationship between the size of the company and the application of external audit services (Carey et al., 2000). In the framework of the theoretical explanation proposed to the relationship between the size of the firm and the audit quality, Rita Yuniarti (2011) has examined the determinants of the audit quality, in proposing the hypothesis that the size of the audit firm and the cost of the audit (audit fees) have an effect on the audit quality. The empirical results of the study of Ali Abedalqader et al. (2011) show that the audit quality is deteriorated when the audit firm takes charge due to the growth of the

magnitude of discretionary accruals. However, the analyses of the data not reveal that the size of the audit firm has a significant impact on the correlation between the seniority of the audit firm and the audit quality. The assumption of the size of the company is therefore formulated as follows:

H5: *The size of the firm has both negative and significant impacts on the audit quality.*

2.5 The Financial Performance of Firm

The financial performance of the company makes use of accounting and financial indicators which enable a control of the companies' management. Thus, it is primarily interested in the effectiveness and efficiency of the implementation of the means put at the disposal of the company (Sadao Nagaoka, 2006). The measurement of the asset returns by the ROA has been cited in various studies (Simnett et al., 2009; Kolk & Perego, 2010).

It measures the profitability of the company in relation to the owners and in accordance with its financial structure. In this sense, the level of performance of the firm can be seen as a proxy of the confidence of shareholders. In this case, a satisfying profitability of assets has a definite influence on the level of support of both investors and creditors. On the basis of what has been advanced, we assume that the audit quality will be influenced by the return on assets (ROA):

H6: *There is a positive and significant relationship between the return on assets and the audit quality.*

3. Research Methodology

3.1 Selection of the Sample

The population we started surveying includes all the highly-rated French companies belonging to the SBF 250 index. Indeed, our sample is composed of three sub-samples. The first sub-sample contains the highly-rated French firms audited by two Big4 auditors. The second contains the French companies audited by Big4 auditor and another Non-Big4 auditor. The last sub-sample contains firms audited by two Non-Big4 auditors.

The accounting variables as well as the financial ones in our econometric model have been extracted from the database Data Stream and the reference documents published by the companies on the financial market authorities' site, during the period 2005 to 2010. From this data panel, the selections and the following changes were made:

Like other researches (Marmousez, 2012) financial, non-governmental and unclassifiable institutions are excluded from the sample of analysis. In addition, all observations for which one of the composing variables our model is not available is also excluded from the panel. These various changes are leading us to a sample of 186 publicly traded French companies, or a total of 1116 observations of business years.

Table 4. Distribution of 186 companies according to the type of auditors' college

	Number of entreprises	Percentage
2 Big4	64	34,40%
1 Big4 et 1 Non Big4	75	40,32%
2 Non Big4	47	25,26%
Total	**186**	**100%**

3.2 Model of Research and Measurement of Variables

In this research, our concern is to study which of the combinations of audit cabinets ensures a better audit quality. Because of this, we are trying to test this relationship via the following model:

$SCORE\_QUL_{it} = \alpha_0 + \alpha_1 \, AUDITOR\_PAIR_{it} + \alpha_2 \, AUD\_F_{it} + \alpha_3 \, LEV_{it} + \alpha_4 \, SIZE_{it} + \alpha_5 \, ROA_{it} + \alpha_6 \, CEO_{it} + \alpha_7 \, INDCEO_{it} + \alpha_8 \, AGE_{it} + \varepsilon_{it}.$

3.2.2 Dependent Variable

$SCORE\_QUL_{it}$: equals 1 if the value of the index quality is greater than the average and 0 if not.

Or $IND\_QUALITY_{it} = \left(\sum_{J=1}^{5} VAR_{i,t} / N \right)$

With:

• $IND\_QUALITY_{it}$: that is the level of the audit quality calculated for firm i at the moment t.

• VAR_{it}: it is the set of variables that make up our quality index. These variables are:

−   *Confiance$_{it}$*: Takes the value of 1 if the average of the daily closing prices in the stock exchange during the week which follows the publication of the report and the opinions issued by the auditors increases as compared to that during the week preceding its publication auditors' opinions and 0 in the opposite case ;

−   *Rotation$_{it}$*: Equals 1 if the firm change its auditor either because of the end of their mandate or due to a dispute, 0 otherwise;

−   *Experience1$_{it}$*: Equal 1 if the auditor 1 to a high number of customers (in our study, greater than 15), 0 otherwise;

−   *Experience2$_{it}$*: Equal 1 if the auditor 2 to a high number of customers (in our study, greater than 15), 0 otherwise ;

−   *Opinion$_{it}$*: Equals 1 if the two auditors certify without reservations the financial statements of the company and 0 otherwise.

N: is the total number of variables used to measure the audit quality.

3.2.3 Independent Variable

• AUDITOR_PAIR$_{it}$: is one of the three binary variables:

✓   Big4_Big4: Equal 1 if the firm is audited by two Big4 auditors, 0 if not.

✓   Big4_Non Big4 Equal 1 if the firm is audited by a Big4 auditor and a Non-Big4 auditor, 0 if not.

✓   Non-Big4_ Non-Big4 equal 1 if the firm is audited by two Non-Big4 auditors, 0 if not.

• AUD_F$_{it}$: The ratio of audit fees between (t) and (t-1) divided by total fee (t-1) ;

• LEV$_{it}$: Measured by the ratio: debts (t-1)/ total assets (t-1) ;

• SIZE$_{it}$: This variable measures the size of the firm as a function of the log of its total balance sheet ;

• ROA$_{it}$: Variation of ROA ratio between t and t-1.

3.2.4 Control Variable

• CEO$_{it}$: A dichotomous variable equal to 1 if firm i undergoes a change leading to t-1 or t and 0 otherwise.

• INDCEO$_{it}$: Equals 1 if the CEO (Chief Executive Officer) of the company is independent and 0 otherwise;

• AGE$_{it}$: Natural logarithm of the number of years of heading/ ranking the company.

4. Results and Interpretations

4.1 Test of Specification of Hausman

The test of Hausman is a test which allows you to determine if the coefficients of the two estimators (fixed and random) are statistically different. In fact, the likelihood of this test is less than 10 %, this implies that the fixed effects' model is preferable to the model of random effects (for the combination of auditors Big4_Big4 the Prob>chi2 = 0.0001; for the combination Big4_ Non-Big4 the Prob>chi2 = 0.0000; for the combination Non-Big4_ Non-Big4 the Prob>chi2 = 0.0000).

4.2 Descriptive Statistics and Correlations of Pearson

Table 5. Descriptive statistics of 186 companies by type of college auditors

Variables	N	Big4_Big4 (N = 64)			Big4_Non Big4 (N = 75)			Non Big4_Non Big4 (N = 47)		
		Mean	Std. Dev.	Type	Mean	Std. Dev.	Type	Mean	Std. Dev.	Type
SCORE_QUL	186	.6406	.4800		.6406	.4800		.6406	.4800	
Big4_Big4	186	.4130	.4926		-	-		-	-	
Big4_Non Big4	186	-	-		1.9970	1.7856		-	-	
Non Big4_Non Big4	186	-	-		-	-		.3028	.4597.	
AUD_F	186	.6018	.3400		.6648	.2022		.6061	.3399	
LEV	186	.5534	.1810		.5642	.1439		.5534	.1810	

SIZE	186	3.2029	.9535	7.0692	2.2169	3.4056	1.5339	
ROA	186	.0364	.0686	.0524	.0939	.05199	.0935	
CEO	186	.2855	.4674	.2855	.4674	.2855	.4674	
INDCEO	186	.5733	.2043	.4435	.2453	.5592	.2185	
AGE	186	1.4259	.46909	1.4259	.4690	1.4259	.4690	

SCORE_QUL$_{it}$: equal 1 if the value of the index quality is superior to the average, 0 if not ;

AUDITOR_PAIR$_{it}$: is one of the three binary variables:

✓   Big4_Big4 : equal 1 if the firm is audited by two BIG4, 0 if not ;

✓   Big4_Non Big4 : equal 1 if the firm is audited by a Big4 and a Non-Big4, 0 if not ;

✓   Non-Big4_Non Big4: equal 1 if the firm is audited by two Non-Big4, 0 if not.

AUD_F$_{it}$: the ratio between audit fees between (t) and (t-1) divided by total fee (t-1) ;

Lev$_{it}$: measured by the ratio: debts (t-1)/ total assets (t-1) ;

SIZE$_{it}$: This variable measures the size of the firm as a function of the log of its total balance sheet ;

ROA$_{it}$: variation of ROA ratio between t and t-1 ;

CEO$_{it}$: a dichotomous variable equal to 1 if the firm i undergoes a change of CEO in t-1 or t and 0 otherwise ;

INDCEO$_{it}$: the number of independent non-executive directors, divided by the total number of members of the councils;

AGE$_{it}$: natural logarithm of the number of years of listing the company.

For each variable, the number of observations is 1116. Several results should be discussed. The statistics of our dependent variable (SCORE_QUL) show an average exceeding 60% which means that most of the companies constituting our sample publish their financial statements in compliance with the legislation. In other words, the audit missions in these companies were successful. That is, the financial statements have been prepared in a rigorous manner and reflect the economic reality of more than half of our sample.

The observation of the average of the explanatory variable (AUDITOR_PAIR) shows that a large part of our sample (75 firms = 40.32 %) prefers the following combination of auditors (Big4_Non Big4).

In addition, we have noted that the audit fees paid for the three combinations of auditors (Big4_Big4; Big4_Non Big4; Non-Big4_Non Big4) are respectively of 60.18%; 66.48 % and 60.61 %. This result shows that the combination of a Big4 cabinet with a Non-Big4 cabinet receives more of audit fees than the others and this is due to the better quality of their audit.

As far as debts are concerned, it seems clear that most of the companies included in our sample have rates of high indebtedness which are on average 55.34% for firms audited by two Big4 auditors and two Non-Big4 auditors and 56.42% for firms audited by a heterogeneous pair of auditors. The latter can be explained by the weight of the bank financing that is high enough for the majority of firms in our sample.

The observation of the control variables shows that on average 28.55% of the companies constituting our sample opt for the change of their CEO. In addition, our statistics show that on average 57.33% of the firms audited by two Big4 are independent; 44.35% for the companies audited by a Big4 and a Non-Big4 and finally 55.92 % for the companies audited by two Non-Big4 auditors. Finally, it is clear from the statistics presented in the table, that the firms in our sample are old enough with an average of 1.4259.

Table 6. Matrix of correlations of Pearson (estimated with: 2 Big4)

	SCORE	Big4_Big4	AUD_F	LEV	SIZE	ROA	CEO	INDCEO	AGE
SCORE	1								
Big4_Big4	.120	1							
AUD_F	-.034	-.006	1						
LEV	-.094	.138	-.130	1					
SIZE	.149	.280	.066	.101	1				
ROA	.065	.019	-.030	-.160	-.088	1			
CEO	-.115	.003	-.169	.039	.001	.120	1		

INDCEO	.019	.034	-.017	-.002	.024	.022	-.065	1	
AGE	.105	.120	.035	.014	.221	.082	.023	.102	1

Table 7. Matrix of correlations of Pearson (estimated with: 1 Big 4 and 1 Non-Big4)

	SCORE	Big4_NonBig4	AUD_F	LEV	SIZE	ROA	CEO	INDCEO	AGE
SCORE	1								
Big4_NonBig4	-.057	1							
AUD_F	.079	-.060	1						
LEV	-.075	-.169	-.054	1					
SIZE	.225	-.164	.359	.184	1				
ROA	.023	-.058	.034	-.180	-.126	1			
CEO	-.115	.042	-.229	.084	-.046	.009	1		
INDCEO	.131	.275	.188	-.281	.065	.104	-.163	1	
AGE	.105	-.172	.153	-.020	.312	.060	.023	.093	1

Table 8. Matrix of correlations of Pearson (estimated with: 2 Non-Big4)

	SCORE	NonBig4_NonBig4	AUD_F	LEV	SIZE	ROA	CEO	INDCEO	AGE
SCORE	1								
NonBig4_NonBig4	-.364	1							
AUD_F	-.025	-.145	1						
LEV	-.094	.145	-.124	1					
SIZE	.177	-.238	.107	.157	1				
ROA	.020	-.046	-.040	-.177	-.125	1			
CEO	-.115	.286	-.177	.039	.005	.002	1		
INDCEO	-.015	-.066	-.045	-.043	-.270	.068	-.043	1	
AGE	.105	-.155	.040	.014	.1769	.058	.0230	.090	1

To avoid the problem of multicollinearity, in other words, verify the hypothesis of independence of the explanatory variables, we referred to Pearson's matrix of correlation. The results show that all of Pearson's correlation coefficients are lower than 0.7, limit from which we usually start to have a serious problem of multicollinearity (Kervin, 1992). This then indicates the absence of multicollinearity between the independent variables included in our logistic regression model.

4.3 Econometric Estimation of the Model and Interpretations of Results

Table 9. The coefficients and statistics of the logistic regression

	Coeff.	Z	P>|z|	Coeff.	z	P>|z|	Coeff.	z	P>|z|
Big4_Big4	.208	0.90	0.368	-	-	-	-	-	-
Big4_NonBig4	-	-	-	1.120	4.44	0.000***	-	-	-
NonBig4_NonBig4	-	-	-	-	-	-	-.746	-2.42	0.016**
AUD_F	5.15	2.50	0.012**	4.484	2.15	0.031**	5.357	2.54	0.011**
LEV	-3.99	-1.92	0.055*	-4.767	-2.22	0.026**	-4.735	-2.31	0.021**
SIZE	1.19	1.97	0.049**	1.970	3.73	0.000***	1.066	1.83	0.067*
ROA	-2.07	-0.89	0.376	-4.214	-2.37	0.018**	-4.115	-2.51	0.012**
CEO	-3.79	-0.77	0.439	-3.183	-0.66	0.507	-3.659	-0.73	0.467
INDCEO	1.07	1.32	0.185	.659	0.69	0.491	.848	1.04	0.300
AGE	3.54	2.39	0.017**	3.746	2.35	0.019**	3.886	2.77	0.006***
LR chi2(8)	33.85			89.85			44.59		
Prob > chi2	0.0000			0.0000			0.0000		
N	186			186			186		
Firm-fixed effects	YES			YES			YES		

*, **, ***: the coefficients are significant at the threshold of 10 %, 5 % and 1 %, respectively

Table 9 above provides the results of the logistic regression of our model. The estimation of our model is subdivided into three steps to choose the best combination of listeners (AUDITOR_PAIR). In this sense, a first estimation of the model was carried out with the explanatory variable (Big4_Big4), a second with the independent variable (Big4_ Non-Big4) and finally, a third estimation with the variable (Non-Big4_Non Big4).

As stated in the table above, the result of the first estimation displays a value of 33.85 % significant at the 1% threshold (Prob > chi2 = 0.0000). The second estimation shows a value of 89.85 % significant at the 1% threshold (Prob > chi2 = 0.0000). Finally, our third estimation presented a value of 44.59 % significant at the 1% threshold (Prob > chi2 = 0.0000).

Our model shows that the explanatory variable AUDITOR_PAIR measuring the choice of the college auditors affirmed our assumptions which are stated above. In this sense, the combination Big4_Big4 is positively associated with our dependent variable SCORE_QUL measuring the audit quality. However, it is not significant (P> |z| = 0.368). The combination Big4_Non Big4 is positively and significantly associated with our dependent variable SCORE_QUL at the threshold of 1% (P> |z| = 0.000). By contrast, the presence of two auditors of type Non-Big4 has a negative and significant effect on the audit quality to the threshold of 5% (P> |z| = 0.016; Coeff. = - 0.746).

The observation of its results shows that when the firm is audited by a homogeneous pair of auditors (either Big4_Big4 or Non-Big4_Non Big4), the result of the audit mission has been demonstrated throughout the game described in the previous section. The latter can be explained by the fact that if the costs of reputation are low enough, either because they are low in absolute terms or because they are shared between the two auditors, the letters choose to take *"No Action"*. The effect of this strategy has a negative effect on the audit quality since the level of disclosure of information that interests the public will be too low and therefore a poor audit quality.

In contrast to the data mentioned above, when the firm is audited by a heterogeneous pair of auditors (Big4_Non Big4), the costs of the choice to take "corrective measures" are reduced to the Big4 auditor. However, the costs of reputation are higher. In addition, for the auditor type Non-Big4 the costs of this strategy are more expensive than the other party (Big4), but, with the advantage that the costs of reputation will be much less expensive (now even equal to zero) of the fact that they have nothing to lose (DeAngelo, 1981). The latter promotes the level of disclosure of information to the benefit of the public or a better audit quality.

The variable (AUD_F) is significant at the brink 5% threshold for the three estimations and has a positive effect on the audit quality. In this sense, the literature anticipates that audit fees have a great influence on the independence of the auditor and therefore on the audit quality (Craswell et al., 2002). Thus, we assume that the audit fees are used to measure the financial dependency of audit firms in relation to the clients, which enables them to carry out the process of verification of accounts and by the result of issuing an opinion reflecting the economic and financial realities of the enterprise.

The variable (LEV) has a negative and significant effect of 5% the indebtedness (which measures the risk of bankruptcy) on the audit quality (P> |z| = 0.055; P> |z| = 0.026; P> |z| = 0.021) respectively for the three combinations Big4_Big4, Big4_Non Big4 or Non-Big4_Non Big4. Indeed, the average debt is greater than 50% for the whole of our sample. The debts thus represent more than 50% of the total assets. These results can be explained by the fact that the more a company is in debt, the less it will disseminate information in its annual report. Our results corroborate with those of Dejean and Martinez (2009b) which anticipate that the debt level has been among the determinants of the diffusion of societal information.

The variable (SIZE) is significant at the edge of 5% threshold for the combination Big4_Big4 (P> |z| = 0.049), 1% for combination Big4_Non Big4 (P> |z| = 0.000), 10% for the combination (P> |z| = 0.067) and denotes a positive effect on the audit quality. Thus, the audit quality is based on the fact that the size of the business is a good indicator of the visibility of its policy and demonstrated well its performance in terms of financial, economic or competitive levels.

The variable ROA has proved not to be significant for the first combination of auditors (P> |z| = 0.376). By contrast, it is significant at the edge of 5% for the second (P> |z| = 0.018) and the third (P> |z| = 0.012) combinations of auditors in indicating a negative effect on the audit quality (Chaney et al. 2004). This result can be explained by the global financial crisis particularly in the euro zone. Indeed, the statistics tend to recall that the European financial markets have experienced striking crises during the last decades (ex. Asian crisis in 1997-1998, the collapse of the internet bubble in 1999-2000, the crisis faced by several countries of the European union) which could explain the results obtained and the negative effect of financial performance on the audit quality.

5. Conclusion

In reference to the works of Marmousez (2012); Paugam and Casta (2012), our research work contributes to the current discussion on the subject of the audit quality using a sample of 186 French companies. We are trying, to provide an answer to our problem which consists on the one hand, in studying the combination of auditors to ensure a better audit quality and on the other hand in demonstrating the gains and the losses of the two parts of the game study (the two auditors).

Our empirical results show that a better audit quality is conditioned by the presence of a heterogeneous pair of auditors (Big4_Non Big4). In addition, the audit quality is influenced by a high level of audit fees, the minimization of the rate of indebtedness, a large size reflecting the performance of the company and the financial means allowing the latter to cope with the economic crises that surrounds it.

All these factors influencing the audit quality are the outcome of the literature (AbuGhazaleh et al., 2011; Francis et al. 1999) to which we add the strategic interdependence between the strategies of the first auditor and the strategies of the second auditor within the company (Richard Fairchild, 2008; Fischbacher & Stefani, 2007; Paugam & Casta, 2012). As well, we have tried in this empirical study, to cover the determinants and the consequences of the choice of the composition of its auditors.

Like any other research, this study has got few limitations. As a matter of fact, the lack of data and the size and choice of the enterprises analyzed in our sample may be considered as possible shortcomings of our research work. These limits can reduce the explanatory power of our chosen models, which could be focused on in future researches.

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Note

Note 1. We believe that the detection of anomalies and risks in the context of an audit mission is an ideal framework because they are based on the competence of the human capital that Non-Big4 auditors are less likely to be owners.