THE DETERMINANTS OF EQUITY BASED COMPENSATION: A BIDIMENSIONAL VALIDITY OF THE AGENCY THEORY

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ABSTRACT

Previous studies have tried to make a comparative analysis between the market-oriented system and the mixed governance system on the determinants of stock option awards for managers; however, these studies exhibit some failures that must be overcome. In addition, we note the absence of studies addressing the validity of the agency theory on the determinants of equity-based compensation in times of instability or crisis. We used a sample of 159 French companies and 203 US companies for the period spanning 2002 to 2010. The results of the present study support the conclusion that the variables measuring the size of the firm, growth opportunity, debt, management and control functions, size of the board, and ownership concentration explain the decision to grant equity-based compensation, regardless of the sample and period considered. Using a variable representing the presence of institutional investors, we show that this type of investor is only involved in controlling the leader in the French case, during a period of financial instability.

Keywords: equity-based compensation, agency theory, financial crisis, information asymmetry

INTRODUCTION

In recent decades, equity-based compensation has attracted the attention of researchers, academics, and government regulatory agencies. Shleifer and Vishny (1997) suggest that the allocation of shares to the manager demonstrates an aspect of corporate governance because these shares convey a personal fortune to the manager rather than to the shareholders, which reduces the possibility of the managers taking measures against company owners; therefore, allocation of shares is a means to mitigate agency problems.

Although research on stock-based compensation continues to proliferate (Barkema & Gomes Mejia, 1998; Harvey & Shrieves, 2001; Ryan & Wiggins III, 2002; Rosenberg, 2003; Brown & Lee, 2010; Liljeblom, Pasternack, & Rosenberg, 2011), most studies highlight the impact of the new international

financial reporting standards 2 "IFRS 2" (Street & Cereola, 2004; Chalmers & Godfrey, 2005; Avallone, Quagli, & Ramassa, 2011; Croci, Gonenc, & Ozkanc, 2012) and the introduction of new laws protecting the interests of minority shareholders, namely Sarbanes-Oxley (SOX) (Gordon, 2003; Holmstrom & Kaplan, 2003; Dicks, 2012), on the decision to grant this type of compensation. However, we see a lack of studies that address the validity of the agency theory for the determinants of equity-based compensation during periods of instability (crisis).

In addition, the studies of Poulain-Rehm (2003), Idi Cheffou (2009), and Gallali and Bouras (2012) remain the only comparative investigation between the two systems of governance (market oriented and mixed) with respect to stock options in particular and equity-based compensation in general. These studies attempt to identify factors that may have an impact on the granting of stock options in the French market and to compare the results with those of other markets, namely the US market; however, this study has some limitations, which we attempt to overcome in this paper.

On the one hand, the authors make comparisons with other investigations without considering the difference in the number of companies studied, the composition at the sector level, and the period of study. On the other hand, these studies have focused only on factors related to the characteristics of the firms and the manager and have ignored factors related to governance, specifically the characteristics of the board of directors and ownership structure.

Agency theory is the main supporter of the theory of allocation of equity-based compensation despite the scandals attached to this component. However, agency theory explains the widespread use of this type of compensation through economic and governance characteristics associated with the firm in an absolute manner without taking into account the specificity of the country or the study period. Faced with generally issued theoretical predictions of the agency theory, we seek to determine whether the factors explaining the allocation of stock-based compensation are insensitive to spatial dimension (change of context) and time (economic conditions).

This study provides a contribution to the literature in several ways through which we attempt to conduct a bidimensional analysis of the predictions of agency theory. On the one hand, we attempt to examine the factors that explain the allocation of equity-based compensation for the American and French markets, and to express the differences that may exist between them. On the other hand, we attempt to determine whether the findings of the agency theory in these determinants are valid regardless of the economic conditions (stability or instability).

LEGAL AND INSTITUTIONAL FRAMEWORK

Our study focuses on a comparison between France and the United States. This section will be devoted to presenting the characteristics of the governance system of these two countries, and the characteristics of equity compensation for each country.

According to Moerland (1995) and Charreaux (1997), the Anglo-Saxon system, of which the United States is a prototype, is characterised by a highly dispersed ownership structure, a low presence of institutional investors where the functions of management and control are combined for one leader, and supervision of the latter occurs mainly through the financial market. In addition, countries adopting this system of governance are characterised by strong protection of minority investors, unlike the French context, which is a prime example of a hybrid system of governance. In the French case, there is a separation of the functions performed by the executive; the financial market is not well developed compared to the United States, and the ownership structure is highly concentrated and characterised by a large presence of institutional investors. In this case, the financial market and an investor with greater control simultaneously perform the function of monitoring the executive.

Equity compensation, in general, and stock options, in particular, have emerged since the 1980s in the United States. However, in France, this practice did not truly develop until the mid-1990s, after publication of a series of reports on good governance practices such as the Vienot (1995) report, Clement (2003), and *Association Française des Entreprises Privées* (AFEP)-*Mouvement des Entreprises de France* (MEDEF) (2008–2012); these highlight the positive effect of managerial ownership on firm value.

A second component of equity compensation, i.e., restricted stock, similar to stock options, has emerged in the United States; it has also emerged in France, with the 2005 Finance Act, which allows French companies to pay employees and executives in the form of share awards subject to performance conditions.

In accounting terms, we do not find a big difference in the recording of stock options and restricted stock. Indeed, companies are adopting international standards (IFRS 2) in accounting for this component of compensation to facilitate the international comparison and interpretation of data.

THE RESEARCH HYPOTHESIS

Based on previous work, we can divide the factors into three groups. First, we analyse the determinants of economic characteristics of firms and factors related to the characteristics of the leader. Next, we present the characteristics relating to corporate governance.

Faced with a lack of literature regarding the explanatory factors for granting equity compensation, and taking into account the economic situation and the context studied, we identify different research hypotheses from the general context of agency theory.

Variables Related to the Firm Characteristics

According to Matolcsy, Shan and Seethamraju (2012), companies pay their leaders according to their characteristics. Indeed, the awarding of compensation is explained primarily through three key ideas: the information asymmetry between the principal and the agent, the liquidity problem, and the conflict of interest between shareholders and the manager and shareholders and creditors.

Firm size

Numerous previous studies have assumed that firm size affects the probability of attributing equity compensation (Uchida, 2006). According to Ryan and Wiggins III (2001), large firms have less information asymmetry, as the press and analysts frequently report their news. However, a positive relationship between the allocation of the equity compensation decision and the size of the firm is the origin of agency theory. Indeed, Eaton and Rosen (1983) find that a manager of a large firm combines more complex assets resulting in greater difficulty for shareholders to monitor the firm's actions.

At the empirical level, results of most previous studies support the ideas of agency theory, such as Core and Guay (1999), Harvey and Shrieves (2001), and Conyon and He (2012). Hence, the hypothesis to be tested is as follows:

H_1: Equity-based compensation is positively related to firm's size.

Liquidity

According to Dechow et al. (1996), Kedia and Mozumdar (2002), and Kim, Yasuda and Hasegawa (2012), equity based compensation provides firms with a method to preserve liquidity, unlike cash compensation such as salary and bonuses, which deplete liquidity.

However, the empirical results are mixed. Matsunaga (1995), Yermack (1995) and Chen, Liu and Li (2010) failed to find a significant relationship. We test the following hypothesis:

H$_2$:   Equity-based compensation is positively related to a firm's liquidity constraints.

Growth opportunity

According to Bryan, LeeSeok and Steven (2000), firms with significant growth opportunities have a range of possible investment decisions known only by the manager, resulting in a rise in information asymmetry between managers and shareholders. One way to overcome this problem is to link the remuneration of CEOs to shareholder interests via equity compensation.

Several previous studies provide evidence to support this idea, including Baber, Janakiraman and Kang (1996), Burns and Kedia (1993), Avallone et al. (2011), and Van Essen, Otten and Carberry (2012). Hence, the hypothesis to be tested is as follows:

H$_3$:   Equity-based compensation is positively related to growth opportunities.

Debt

Based on the predictions of agency theory, Jensen (1986) suggests that, due to contractual payment obligations, the repayment of the debt limits manager's discretionary behaviour and attenuates the agency problem. Accordingly, the use of debt may even reduce the demand for equity compensation as a substitute for managerial control (Qin, 2012).

Empirical tests have yielded inconclusive results. Indeed, some studies confirm the relationship of substitutability between debt and equity compensation, such as Ittner, Larcker and Meyer (2003), Uchida (2006), Liljeblom et al. (2011) and Qin (2012). However, other studies failed to find a significant relationship between these two variables (Bryan et al., 2000; Chen et al., 2010). We test the following hypothesis:

H$_4$:   The highly leveraged companies attribute less compensation in the form of shares to their managers.

Noise (ROA-equity returns)

Bryan et al. (2000) suggest that noise in a performance measure is an important factor in determining a manager's compensation contract. Empirically, the noise variable is measured by the variance of earnings returns or equity returns (Shin, 2005) or the ratio between the two variances (Lambert & Larcker, 1987; Holthausen & Larcker, 1991).

From the assumption of substitutability, the agency theory assumes that when a performance measure is noisy, the firm gives less weight to this measurement to determine CEO pay packages (Shin, 2005). Yermack (1995) and Bryan et al. (2000) confirm this idea when they find that the noisiness in accounting data (stock) is positively (negatively) associated with equity compensation. From the above we can formulate the following hypothesis:

H$_{5a}$: There is a negative relationship between equity compensation and noise in stock returns.

H$_{5b}$: There is a positive relationship between equity compensation and noise in earnings returns.

Variables Related to Manager Characteristics

Manager age

The problem horizon is another facet of the agency theory used to explain the granting of equity to a manager. Indeed, the leader approaching retirement refuses all projects characterised by high initial expenditure in research and development because this type of project would be profitable only after a long period of time.

In addition, according to Qin (2012), equity-based compensation is a form of managerial ownership; therefore, the prediction of the agency theory is an alignment mechanism of interests, which leads to decision horizon problem. The equity-based compensation is an alignment of interest mechanism, designed to alleviate decision horizon fears. Therefore, there is a tendency towards intensive use of equity compensation in compensation contracts of the older executives, especially those approaching retirement age (Gibbons & Murphy, 1992).

Empirically the results are inconclusive. First, Yermack (1995) and Oreland (2008) did not find a significant relationship; second, David, Kochhar and Levitas (1998), Tzioumis (2008) and Van Essen et al. (2012) found a

negative relationship between age and the likelihood of the manager to allocate equity-based compensation. From the theoretical findings, we can formulate the following hypothesis:

H_6:   Firms allocate more equity-based compensation to an older manager.

Manager tenure

According to Ryan and Winggins III (2002) a manager characterised by a long-term period in the executive office raised more shares when the stock option awards or bonus shares would have a minimal effect on the alignment of interests between shareholders and the manager. However, based on the entrenchment theory, the research also shows that the manager can take advantage of his seniority within the firm to receive excessive compensation, including equity-based compensation (Lippert & Moore, 1994). From the agency theory assumption, we can formulate the following hypothesis:

H_7:   There is a negative relationship between manager tenure and equity-based compensation.

CEO duality

Based on the proposals of agency theory, Petra and Dorata (2008) confirmed that the governance structure and, in particular, the dual functions of a manager affect the composition of executive compensation. Baliga, Moyer and Rao (1996) shows that the title of Chairman of the board of directors is an honorary award for officers who have achieved satisfactory results during an initial trial period. Consequently, the manager, who has two functions (CEO and chairman of the board), has demonstrated his ability to create shareholder value, and therefore these interests are most likely aligned with those of shareholders (Ryan & Wiggins III, 2002; Qin, 2012).

However, the agency theory assumes that the functions of management and control must be separated to improve the level of control (Vigliano & Barré, 2010); therefore, in the case of dual functions, decisions reside with the same person, which creates an agency problem. Thus, based on this finding we can formulate the following hypothesis:

H_8:   The grant of equity-based compensation as a way to mitigate conflicts of interest is positively related to CEO duality.

Variables Related to Corporate Governance

We will determine corporate governance through the features of the board; we will also determine ownership structure in general and the concentration of ownership and the presence of institutional investors in particular. These two forms of ownership have been chosen because of the divergence between the two countries, as we previously mentioned in the section related to the presentation of the legal and institutional framework.

Board of director characteristics

Whatever is the direction of the previous governance literature (agency theory or managerial power theory), mechanisms related to corporate governance have an influence (positive or negative) on the probability of granting shares to the manager.

Based on agency theory, a board of directors characterised by small size (Yermack, 1996; Ryan & Wiggins III, 2002; Shin, 2005), a high degree of independence (Jensen, 1993; McNulty & Pettigrew, 1999), and the presence of a compensation committee (Conyon & He, 2012) contribute to a strong governance structure that reduces the need for equity compensation (Qin, 2012). In fact, these mechanisms ensure enhanced managerial monitoring; in this case, the integration of equity-based compensation does not have a great effect on the decisions made by the manager. Therefore, we test the following hypothesis:

H$_9$: Firms with small board size, a high percentage of independent directors, and the presence of a compensation committee attribute less equity-based compensation.

Ownership structure

In terms of ownership structure, according to Jensen and Meckling (1976), a dispersed ownership cannot possibly provide effective supervision of the leader's behaviour. Indeed, Benz, Kucher and Stutzer (2001) suggest that none of the minority shareholders has an incentive to participate in the monitoring process. Therefore, the interests of shareholders are dispersed and difficult to coordinate. Thus, the higher the concentration of shares, the more shareholders are motivated to exercise effective control to encourage the manager to make creative value decisions. Faced with this situation, firms have no incentive to allocate equity compensation, because the interests of both parties are aligned (Bryan et al., 2000; Bebchuk & Fried, 2006).

In addition to the concentration of ownership, the identity of the shareholders of the company may also restrict or enable managerial power over the practice of executive compensation (Van Essen et al., 2012). According to Useem (1996), one of the most important changes in corporate governance over the last 20 years is the dramatic increase in the participation of institutional investors in the capital of the company.

Although investor status does not provide some investors more formal power than other investors, institutional investors often have substantial interests. Therefore, this type of investor has a tendency to more actively control, and may be able to limit executive power in the implementation of the compensation policy (Hartzell & Stark, 2003; Bebchuk & Fried, 2006).

Fama and Jensen (1983) emphasise that the shareholders/manager agency problem may be mitigated by a number of control mechanisms such as the presence of institutional investors. Therefore, the proportion of shares held by institutional investors is a sign for effective control of the leader that allows a reduction in agency costs and, consequently, a low allocation of equity compensation. Therefore, based on these agency theory findings, we can formulate the following hypothesis:

H_{10a}: The allocation of equity compensation as a means to mitigate conflicts of interest is negatively related to ownership concentration.

H_{10b}: The allocation of equity compensation as a means to mitigate conflicts of interest is negatively related to the presence of institutional investors.

SAMPLE AND DATA SOURCES

Our initial sample for the US case is composed of 300 large US companies, based on the market capitalisation criterion, and belonging to the S&P 500 stock market index. For the French case, our initial sample consists of 250 French companies listed on the Paris Stock Exchange and is part of the CAC All-Tradable stock index (ex SBF 250).

In the two samples, we have eliminated American and French financial companies with 16% and 14% of the total sample, respectively. We also excluded companies with defects in their accounting information and related governance data, 16% of the total sample for the US firms and 22% for the French firms.

Finally, our study focuses on a sample composed of 203 US companies and 159 French companies for a period of study from 2002 to 2010, with 1827 and 1431 observations (firms/year), respectively. For both cases, our sample consists of the service sector (30%), the industrial sector (26%), the consumer goods and information and communication technology sectors (18% each); the health sector represents only 8% of all companies selected.

The data relating to compensation, including stock options and restricted stock granted to the executive, as well his age and the period of occupation in the chief executive position, were collected from two main sources. In fact, in the US and French cases, information is collected respectively from the Compustat ExecuComp database and manually from annual reports.

Variables related to accounting data are assembled using Compustat North America and Compustat Global databases.

Variables related to corporate governance (board characteristics, the presence of a compensation committee, and ownership structure) are collected manually from Proxy Statement DEF14a and the Thomson Institutional Ownership database for the US case and reference documents for the French.

MODEL AND SELECTED VARIABLES

Several studies attempt to determine why some firms allot equity-based compensation more than others. However, the results remain inconclusive because of the diversification in the study period, measurements of selected variables, and estimation models.

To eliminate the factors that may affect the results in our study, such as the composition of the sample, the diversification of variables, measures and multiple econometric methods, we perform a comparison under the same conditions for both cases (France vs. US) and two periods (stability vs. crisis).

To test the above hypotheses, we use the Tobit model regression to determine the factors that may affect the decision to award equity-based compensation to the manager[1].

$$Equiy.Comp = \alpha_0 {}_+ \alpha_1 Size + \alpha_2 Opport + \alpha_3 No.Div + \alpha_4 Lev + \alpha_5 Noise.ROA + \alpha_6 Noise.Ret + \alpha_7 Age + \alpha_8 Tenure + \alpha_9 Dual + \alpha_{10} Bd.Size + \alpha_{11} Indep.Dir + \alpha_{12} Comp.Comm + \alpha_{13} Concent + \alpha_{14} Institu.Own + \sum \phi_i.sec_i + \sum \phi_i Y_i + \zeta$$

(1)

The dependent variable (Equity.Comp) is the natural logarithm of (1 + values of stock options and restricted stock received by the manager in year t)[2] (Brown & Lee, 2010; Guillet, Kucukusta, & Xiao, 2012; Kim et al., 2012). For independent variables:

- Size: Firm size, measured by the logarithm of total assets;
- Opport: Growth Opportunity, measured by the market to book ratio;
- No.Div: Non dividend distribution[3], binary variable that is 1 if the firm does not distribute dividends and 0 otherwise;
- Lev: The leverage of the company, measured by the ratio of total debt and book value of total assets;
- Noise.ROA: Noise in earnings returns, calculated by the standard deviation of return on assets (ROA) as measured by (Net income/Total assets) over the past five years compared to year t;
- Noise.Rent: Noise in stock returns, calculated by the standard deviation of return on stocks over the past five years compared to year t;
- Age: Manager's age in years;
- Tenure: Number of years during which the manager filled the position of manager;
- Dual: Dummy variable equal to 1 if the manager is also the board chairman and 0 otherwise;
- Bd.Size: The size of the board measured by the number of directors;
- Indep.Dir: The percentage of independent directors on the board;
- Comp.Comm: A dummy variable that equals 1 if the company has a committee and 0 otherwise;
- Concent: The concentration of ownership measured by the percentage of shares held by the three largest shareholders;
- Institu.Own: The presence of institutional investors as measured by the percentage of shares held by institutional investors;
- Sec: A dummy variable indicating the presence of sector effect;
- D: A dummy variable indicating the period effect.

Table 1

Descriptive statistics of selected variables

	Number	Average	Min	Max	Standard Deviation	Difference FR-US
Dependent Variable						
Equity.Comp						
FR	1431	0.303	0	3.164	0.464	-1.208***
US	1827	1.511	0	4.504	0.831	
Independent variables						
Economic Variables						
Size						
FR	1431	7.268	1.656	11.875	2.089	- 0.415***
US	1827	7.684	1.656	12.3338	2.132	
Opport						
FR	1431	2.458	0.722	7.304	0.399	- 1.312***
US	1827	3.770	0.136	10.681	1.326	
No.Div						
FR	1431	0.197	0	1	0.397	- 0.012***
US	1827	0.209	0	1	0.406	
Lev						
FR	1431	0.245	0	1.669	0.182	0.016***
US	1827	0.229	0	1.440	0.165	
Noise.ROA						
FR	1431	0.043	0	0.449	0.072	0.006***
US	1827	0.037	0	0.532	0.056	
Noise. Rent						
FR	1431	0.547	0.004	4.477	0.476	0.181***
US	1827	0.366	0.022	3.346	0.259	
Variables associated with the characteristics of the manager						
Age						
FR	1431	54.937	26	80	8.197	- 0.908***
US	1827	55.845	39	80	6.445	
Tenure						
FR	1431	9.676	0	48	8.510	2.892***
US	1827	6.784	0	47	6.218	
Dual						
FR	1431	0.704	0	1	0.456	- 0.105***
US	1827	0.809	0	1	0.393	
Variables associated to corporate governance						
Bd.Size						
FR	1431	9.532	3	21	3.937	1.10***
US	1827	10.630	5	23	2.204	
Indep.Dir						
FR	1431	0.362	0	1	0.243	-0.406***
US	1827	0.768	0	1	0.182	
Comp.Comm						
FR	1431	0.616	0.722	1	0.486	-0.354***
US	1827	0.970	0.136	1	0.169	
Concent %						
FR	1431	44.92	0	99.1	23.02	26.34***
US	1827	18.58	0	96.87	14.69	
Institu.Own %						
FR	1431	61.25	0	99.1	27.97	22.83***
US	1827	38.42	0	99.8	27.90	

Notes: *** Significant at 1%

The table shows the descriptive statistics for the 159 French companies and 203 US companies for the period of 9 years from 2002 to 2010. The dependent variable is calculated as the natural logarithm of equity-based compensation (1+ value of stock options and restricted stock valued by the Black-Scholes formula) received by the manager, in U.S. dollars, we used the annual average exchange rates USD / Euro for each year [2002: 0.9411, 2003: 1.1286, 2004: 1.2417, 2005: 1.2436, 2006: 1.2545, 2007: 1.3687, 2008: 1.4648, 2009: 1.3892, 2010: 1.3244]. The independent variables: Size: The logarithm of total assets, Opport: The market to book ratio, No.Div: Dummy variable equal to 1 if the company does not distribute dividends and 0 otherwise, Lev: The ratio of total debt and book value of total assets, Noise.ROA: The standard deviation of return on assets over the last five years compared to the year t, Noise.Rent: the standard deviation of stock returns over the past five years compared to year t, Age: Manager's age in years, Tenure: Number of years during which the manager filled the position of manager, Dual: Dummy variable equal to 1 if the manager is also the board chairman and 0 otherwise. Bd.Size: Number of directors, Indep.Dir: The percentage of independent directors in the board, Indep.Dir: The percentage of independent directors in the board, Comp.Comm: A dummy variable that takes 1 if the company has a compensation committee and 0 otherwise, Concent: The concentration of ownership measured by the percentage of shares held by the three largest shareholders, Institu.Own: The presence of institutional investors as measured by the percentage of shares held by institutional investors.

INTERPRETATION OF RESULTS

Descriptive Analysis

Table 1 shows the descriptive statistics of variables used for both samples. The dependent variable (Equity.Comp) is measured by the natural logarithm of the value of equity-based compensation. The average of this variable for US companies is 1.511, well above the average for French companies, which is 0.262.

This difference is explained by the distribution of the total remuneration received by the manager. Figures 1 and 2 show that the remuneration package of French managers is composed primarily of cash compensation whereas in the US, the equity-based compensation represents approximately half of the total compensation throughout the study period (2002–2010).

In the French case, we note that the percentage of equity compensation increases for the years 2006 and 2007; this finding is explained by the new Act in 2005 authorising French managers to receive free shares subject to performance conditions (restricted stock units). During the years 2008 and 2009, which corresponds to the period of crisis, the equity-based compensation began to decrease. This reduction allows us to infer that during periods of instability, French managers prefer certain cash remuneration over random stock-based compensation, in which their awards are subject to performance conditions.
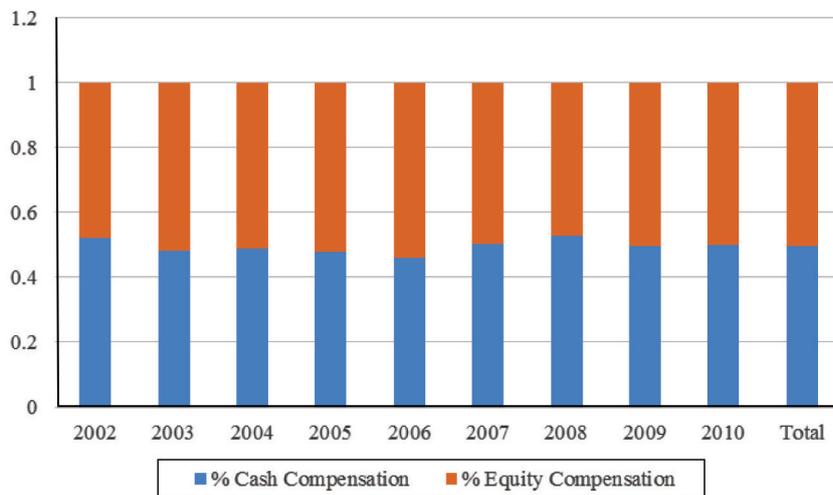

Figure 1. Distribution of compensation (cash and equity) of French managers
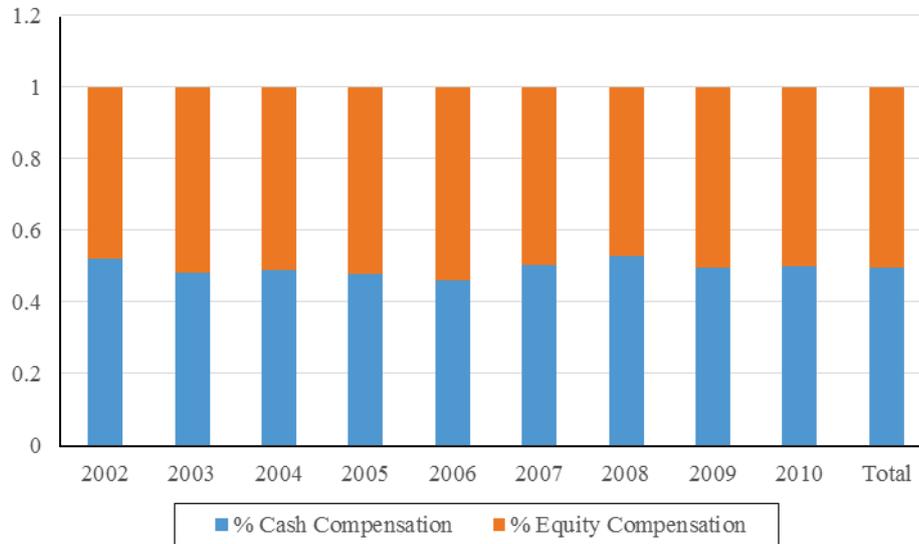
Figure 2. Distribution of compensation (cash and equity) of American managers

We divided independent variables into three groups: economic variables related to the characteristics of the firms, variables related to the characteristics of the manager, and variables related to the board. We note that, for the variables related to the characteristics of the firms, the differences in the averages are not high, except for variables measuring firm size and growth opportunities; these have a large and statistically significant difference.

For variables related to the characteristics of the manager, the average ages of French and American leaders are, respectively 55 and 56 years. On average, the French manager holds the post for 10 years, whereas the US the manager remains for seven years. This result is evident, because the American managers' market is very active compared to the French. Therefore, there is a high probability of change in incompetent managers when the agency problem arises between the agent and the principal.

In addition, this difference is explained by a high percentage of independent directors; 76.8% in the US compared to only 36% in France. According to the "CEO Succession Practices" report published in 2012 (Schloetzer, Tonello, & Aguilar, 2012), strong independent directors could motivate the board to revoke the manager who performs below expectations.

We note that there is a large difference in the average for US Companies compared to French companies for the variables related to the presence of independent directors and the presence of the compensation committee because US law is very rigid compared to French law. Indeed, the Securities and Exchange Commission (SEC) and the NASDAQ authorities require the boards of US Companies to have independent directors as a majority and to have a compensation committee.

For the variable measuring the size of the board, we see that the average for the two samples is very close but is greater than the optimum value determined by Jensen (1993), which assumes that the board should be composed of seven or eight directors.

We note that there is a large difference in average for variables measuring the concentration of ownership and institutional investors (26.34% and 22.83%). This difference is expected because of the divergence in the governance system for these two countries.

Tables 2 and 3 show the Pearson correlation coefficients for the French and American companies, respectively. Note that in both cases the correlation coefficients between variables are weak. Thus, we can deduce that there is no multicollinearity problem in the model analysis.

The dependent variable (Equity.Comp) results showed a significant association for both cases, between this variable and the explicative variables (Size, Age and Indep.Dir). For the variables Lev, Noise.ROA, Noise.Rent, Tenure and Bd.Size, the significance of the correlation coefficient with the endogenous variable (Equity.Comp) depend on the selected sample. There is an absence of significant correlation between the variable measuring the growth opportunity (Opport) and the dependent variable (Equity.Comp), regardless of the sample.

Interpretation of Results

The empirical results of the paper are presented and discussed in this section including a bidimensional analysis of the validity of the agency theory. First, we verify the above hypothesis for two samples of different systems of governance and explain the differences that may exist between the two samples. Second, given the importance of the financial crisis, we verify whether the agency theory is enabled during periods of instability, in terms of equity-based compensation.

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Table 2
Pearson correlation matrix (French firms)

	Equity.Comp	Size	Opport	Lev	Noise.ROA	Noise. Rent	Age	Tenure	Bd.Size	Ind.Dir	Concent	Institu.Own
Equity.Comp	1											
Size	0.2314***	1										
Opport	0.0678	–0.1257***	1									
Lev	–0.0275	0.4505***	–0.2457***	1								
Noise.ROA	–0.0875**	–0.3547***	0.2457***	–0.1257	1							
Noise. Rent	0.2547***	–0.0024	0.2547***	–0.2157**	0.2754	1						
Age	0.0578*	0.1254***	–0.1254	0.12547	–0.1254***	–0.2157****	1					
Tenure	–0.1572***	–0.4521***	0.0142***	–0.2157	–0.1525***	–0.1457***	0.2587***	1				
Bd.Size	0.0125	0.12578**	–0.1257	0.1254	–0.0542**	0.0245	–0.0125	–0.2145	1			
Ind.Dir	0.1257***	0.1234***	–0.2575***	0.2575*	–0.0125	0.1254*	0.2544**	–0.2543***	0.2345	1		
Concent	0.4587*	0.3256***	–0.2457*	0.1425**	0.1245***	0.3254*	0.1235**	0.1254***	0.4578*	0.2345*	1	
Institu.Own	0.2457**	0.1548*	0.2454**	0.2457**	0.1547**	0.4578***	0.1457*	0.2458*	0.2134*	0.1452**	0.6245**	1

Notes: This table shows the correlation coefficients between the variables used for a sample of 159 French firms for the period from 2002 to 2010.
*** Significant at 1%, ** Significant at 5%, * Significant at 10%

Table 3
Pearson correlation matrix (US firms)

	Equity.Comp	Size	Opport	Lev	Noise.ROA	Noise. Rent	Age	Tenure	Bd.Size	Ind.Dir	Concent	Institu.Own
Equity.Comp	1											
Size	0.1126*	1										
Opport	0.2457	-0.2154 **	1									
Lev	-0.1245***	0.1254*	-0.1245*	1								
Noise.ROA	0.1245	0.125*	0.3154**	0.1254*	1							
Noise. Rent	0.1254**	-0.2154**	0.4564**	0.2145	0.1245*	1						
Age	0.2458**	-0.1254**	-0.2354**	0.3254	-0.1245**	-0.245***	1					
Tenure	-0.0012	-0.1254**	0.2785	-0.1247 **	0.1245**	0.2147 **	0.4521*	1				
Bd.Size	0.1257*	0.2345***	0.1257**	0.0054 ***	-0.2456**	-0.2157*	0.2518**	-0.1279***	1			
Ind.Dir	0.1254**	0.1245*	-0.0754*	-0.2345	-0.1548	-0.2548**	0.0821***	-0.1257*	0.1288	1		
Concent	0.1454**	0.4578**	0.0045*	0.1257**	0.1454**	0.2457*	0.1145*	0.2458**	0.3245**	0.1245**	1	1
Institu.Own	0.2458*	0.5878*	0.1245**	0.4520*	0.0145	0.1345**	0.3254**	0.3457*	0.0014*	0.3257***	0.5424***	0.7458***

Notes: This table shows the correlation coefficients between the variables used for a sample of 203 US firms for the period from 2002 to 2010.
*** Significant at 1%, ** Significant at 5%, * Significant at 10%

Comparative Analysis between the Two Countries

Table 4 presents the results of estimating equation (1). Column (1) presents the results of all data related to French and American firms to determine whether US companies attribute more pay to equity-based compensation compared to their French counterparts[iv].

Columns (2) and (3) show the results of estimating equation (1) for two separate samples. Note that the coefficient (US indicator) is positively significant at 1%. Indeed, most American companies reward their managers in the form of equity-based compensation more than the French, which has been verified in the

descriptive statistics. This result can be explained by the difference in the system of governance between the two countries.

Table 4
Results of regression of the determinants French and American firms

	Pooled	France	US
US indicator	2.396***(9.81)		
Size	0.152***(3.21)	0.3927***(4.50)	0.058*(1.81)
Opport	0.133**(1.95)	0.4648***(4.44)	0.053**(2.54)
No.Div	0.016(1.36)	0.8951**(1.71)	−0.033(−0.41)
Lev	−0.512***(−4.27)	−0.428*(−1.69)	− 0.777*(−1.91)
Noise.ROA	0.245(0.29)	0.3464(1.24)	−0.580(−0.46)
Noise.Rent	0.765***(3.87)	−0.111(−0.51)	0.209***(6.02)
Age	−0.034***(−2.99)	−0.046***(−3.01)	−0.004(−0.30)
Tenure	−0.0154(−1.02)	−0.029(−1.07)	−0.140(−0.23)
Dual	0.178(1.48)	0.247**(2.02)	0.084**(1.99)
Bd.Size	0.060**(2.05)	0.124***(3.02)	0. 497***(3.56)
Comp.Comm	0.957***(3.68)	0.793***(2.78)	−0.144(−0.23)
Ind.Dir	0.278***(3.21)	0.180**(2.09)	0.178**(2.14)
Concent	−1.642*** (− 3.60)	−0.183***(−3.04)	−0.930*(−1.71)
Institu.Own	0.154(0.63)	−0.099***(−3.21)	0.1527(0.54)
Constant	−1.907***(−2.43)	−1.767***(−4.89)	−3.021**(−2.40)
Sector	Yes	Yes	Yes
Year	Yes	Yes	Yes
Log likelihood	−5939.7849	−1636.392	−4228.8195
N	3258	1431	1827

Notes: *** Significant at 1%, ** Significant at 5%, * Significant at 10%
The table presents the results of the regression of the determinants of award of equity-based compensation for the different cases (Pooled, French and American) for the period from 2002 to 2010.

According to Charreaux (2009), the control of the manager is lower in the case of a market-oriented system of governance (US). Conversely the French context is characterised by a mixed system in which control is stronger and occurs mainly in the ownership structure. Consequently, faced with less active control in the Anglo-Saxon system, equity-based compensation is a way to align interests between the agent and the principal.

In addition, this difference is explained in legal terms because France is unlike the US; in France, the allocation of equity compensation has only been recently regulated by the enactment of Nouvelles Régulations Economiques

(NRE) or New Economic Regulations 2001, which only allows the allocation of stock options to executives. Free shares subject to performance conditions (restricted stocks) are regulated by the Finance Act of 2005, which states that the restricted stocks previously reserved for shareholders, are available to company management employees.

For the variable indicating the size, we note that there is a positive and statistically significant relationship at the 1% level for the French and 10% level for the US, which confirms most of the results of previous research, such as Bebchuk and Weisbach (2010), Bryan et al. (2000), Avallone et al. (2011) and Gallali and Bouras (2012). According to Vlittis and Charitou (2013), large firms require more talented managers and are more difficult to control, which makes equity-based compensation a most important mechanism for reducing the agency problem for these types of companies.

Consistent with our expectations and previous works such as Du and Lin (2011) and Van Essen et al. (2012), firms with high growth opportunity distribute more equity-based compensation. In fact, the market to book ratio represents a proxy for growth opportunities, and is positive and statistically significant at 1% regardless of the sample used. According to Ozkan (2007), it is difficult to observe the actions of the manager in a high growth opportunity business as equity-based compensation is one of the solutions to facilitate manager control.

The leverage ratio (Lev) is negative and significant at the 10% level for both cases, supporting hypothesis 3. According to Qin (2012), highly leveraged firms have a high risk of bankruptcy while debt holders can influence these companies. Therefore the use of equity-based compensation is reduced because these payments encourage the manager to make risky decisions to increase shareholders' wealth and the manager's wealth. In addition, according to Jensen (1986), the debt repayment is a way to monitor and limit the manager's discretion in cash flow. An important leverage is a substitute for the use of equity-based compensation for executive control.

For variable (No.Div), which represents a proxy for the liquidity of firms, the results are inconclusive and depend on the chosen market. Indeed, in France, stock-based compensation is a way to maintain liquidity (positive and statistically significant at the 5% level), which is consistent with results found by Chen et al. (2010). This situation differs from the American context where the decision to award equity-based compensation is not related to the liquidity constraint (non-significant relationship between the value of stock-based compensation and variable [No.Div]), but is a mechanism of increasing control. In the American context firms are less controlled than their French counterparts due to the

difference in the governance system between the two countries and, in particular, the dispersion of capital forcing shareholders to exercise effective control.

The variable indicating the noise in stock returns (Noise.Rent) is related to the stock market, unlike other variables, which explains the non-converging result for the two samples. On the French market level, the noise linked to stock returns is not a factor in the allocation of equity compensation, unlike the US market, where the variable (Noise.Rent) is statistically significant at the 5% level. Indeed, in the US context the financial market is a mechanism to monitor the manager. The result found is consistent with the previous work of Core and Guay (1999) and Shin (2005). Indeed, Breedman and Viswanathan (1998) suggest that high noise in stock returns is a sign of information asymmetry between the shareholder and manager while the probability to adopt equity-based compensation plans for the manager is essential to reduce this asymmetry.

Considering the manager's age, we reject the horizon problem hypothesis, which proposes that the manager approaching retirement benefits from more compensation in the form of stocks. In the American case, we failed to find a significant relationship as expected by the result obtained by Oreland (2008). For the French case, managers approaching retirement prefer certain compensation rather than random remuneration based on shares, in accordance with the work of Ryan and Wiggins III (2002) and Gallali and Bouras (2012).

An explanation of the negative effect of age on stock-based compensation could be that the long-term nature of this type of compensation reduces the likelihood of benefit from this compensation for executives entering retirement (Tzioumis, 2008). Another explanation for this negative relationship is developed by Eaton and Rosen (1983), who suggest that risk aversion may increase with the age of the leader and therefore, can influence the preferences of the individual for risky compensation and primarily equity-based compensation.

We find that US and French companies with a manager who is also Chairman of the board have more equity-based compensation (positive and statistically significant at the 10% level). This finding is in accordance with the agency theory, which states that if the management and control functions of are combined in one person, agency problems arise. According to Ryan and Wiggins III (2002), this conflict led to the need for equity-based compensation because the monitoring by the board is likely to be less effective.

For the variable indicating the size of the board, we found a positive and statistically significant relationship at 1% for both samples. This result is consistent with the study of Ozkan (2007) and confirms the finding of agency theory, which states that large board size can cause communication and

coordination problems among members. Given this situation, the board becomes ineffective in controlling the manager, while the equity-based compensation can be a substitute to reduce the opportunistic behaviour of the manager.

The presence of the compensation committee is not a mechanism for monitoring the equity-based compensation of the manager. The inefficiency of this committee is due to its composition. In the US case, our results converge with the results of the study of Qin (2012), where the mechanism is not a determinant that can have an influence on the decision to award compensation in the form of stocks. Indeed, in this context, the compensation committee is composed entirely of independent directors with a reduced probability for the manager to take advantage of excessive compensation in shares, as these independent directors have no relationship with the manager. In addition, this type of administrator can be served by other committees such as the audit committee, while the control over executive compensation and performance-based compensation is not effective. Based on the foregoing, the role of the compensation committee is not conclusive and cannot be detached from the efficiency or inefficiency of the mechanism.

In France, according to Abate, Jaclot and Petit-Perrin (2000), the role of the compensation committee remains low because, on the one hand, the manager may be a member of this committee and, on the other hand, the law only requires a minimum of one third of independent directors on the committee. The legal requirement explains the positive relationship (statistically significant at the 1% level) in accordance with the work of Conyon and He (2012).

In addition, we find a positive and statistically significant relationship at the 5% level between equity-based compensation and the presence of independent directors on the board for both cases, according to the results obtained by Franks, Mayer and Renneboog (2001) and Croci et al. (2012). This result is inconsistent with the predictions of the agency theory made by Fama and Jensen (1983), who argue that the presence of independent directors is likely to have an incentive to ensure effective control. Accordingly, based on the hypothesis of substitutability of governance mechanisms, there is a low probability of assigning stock-based compensation as a means of reducing the manager's opportunistic behaviour when firms are characterised by a large percentage of independent directors. Our result confirms the idea proposed by Ozkan (2009), who reported that independent directors do not fulfil the function of control and reduction of managerial entrenchment. However, the main function of such directors is to improve firm performance thus, they have a strategic role to strengthen the control of the manager.

For the variable measuring the concentration of ownership, there is a negative and statistically significant relationship at the 1% threshold in the French case and 10% in the American case. Indeed, if a high concentration of ownership is characterised by a highly dispersed ownership structure, holding a large fraction of actions is a device that reduces conflicts of interest between the principal and the agent. Faced with this situation, companies distribute under equity-based compensation as a means of aligning interests between these two parties (Jensen & Meckling, 1976; Shleifer & Vishny, 1997).

At the institutional ownership level, our result confirms our theoretical findings in which institutional investors for the French context succeed in exercising more control over the executive. Indeed, there is a negative and statistically significant relationship at the 1% threshold in this case. However, in the American case, our result fails to find a significant relationship. We can deduce the importance of this type of investor in controlling the behaviour of the French leader compared to the possibility of opportunism in the US case. Indeed, in the United States this investor has a more strategic role and intervenes in the process of decision making more than controlling officers in France; this explains the absence of a significant relationship between this category of investor and the allocation of equity compensation as a probable device of managerial control.

Comparative Analysis for the Two Periods

To check whether the hypothesis derived from agency theory in terms of stock-based compensation are valid regardless of the period of study for a set of samples (159 French companies and 203 US companies), we will divide our sample in two sub-periods. The interval of instability (market crisis) corresponds to the years 2002 to 2008 and 2009, where these years are characterised by high volatility in the S&P 500 and CAC All-Tradable indices due to the computer crisis and the subprime crisis. The second interval is in other years where there has been stability in the S&P 500 and CAC All-Tradable indices.

Table 5 shows the estimation results for the two periods. On the level of the variables related to the characteristics of the firms, the results for the variables measuring firm size, growth opportunity, and leverage are similar and do not depend on the period of stability or instability. In fact, these variables are consistent with the prediction of the agency theory and are not sensitive to changes in economic conditions.

During the crisis period, the variable (Noise.Rent), where firms with high noise in stock returns distribute under stock-based compensation and the manager prefers the accounting performance pay, performs contrary to what is expected. In fact, according to Hugon (2010), variability of stocks during this period is

high, which leads to high information asymmetry between shareholders and the manager during this period; therefore, managerial ownership and, in particular, equity-based compensation is one way to reduce the problem of information asymmetry.

Table 5
Results of regression of the determinants of equity-based compensation for periods of stability and instability

	Pooled (stable period)	Pooled (instability period)
US indicator	1.411***(5.97)	3.767***(8.61)
Size	0.112***(2.70)	0.210***(2.68)
Opport	0.326***(5.51)	0.235**(2.00)
No.Div	0.186(1.09)	−0.023(−0.07)
Lev	−1.064**(−2.55)	−0.739**(−0.97)
Noise.ROA	0.493(1.50)	−0.020(−0.92)
Noise.Rent	0.115(0.63)	0.174***(4.71)
Age	− 0.019(1.53)	−0.043**(−2.01)
Tenure	−0.009(−0.89)	−0.020***(−2.92)
Dual	0.199**(1.99)	0.559**(1.76)
Bd.Size	0.077***(3.14)	0. 812***(5.73)
Comp.Comm	−0.770***(−3.14)	0.134***(2.92)
Ind.Dir	0.314***(3.87)	0.161***(2.76)
Concent	−0.146***(−3.47)	−0.175**−(2.09)
Institu.Own	0.099(0.47)	−0.196***(−3.38)
Constant	−2.15***(−3.01)	−3.158**(−2.12)
Sector	Yes	Yes
Year	Yes	Yes
Log likelihood	−3568.2938	−2195.603
N	2172	1086

Notes: *** Significant at 1%, ** Significant at 5%,
The table presents the results of the regression of the determinants of award of equity-based compensation for periods of stability and instability.

Another explanation is rooted in the signal theory. According to Guimbert and Vallat (2001), during the period of instability, an allocation of stock-based compensation is a signal to maintain the trust and interests of investors in the company's long-term state; the variability of the stocks is occasional and limited to the crisis period.

For the entire sample, regardless of the holding period, the decision to allocate equity-based compensation is not explained by illiquidity or high noise in earnings returns.

At the level related to the characteristics of manager variables, we find that, during the period of stability, the age and experience of the manager and the cumulative functions are not determinants in the decision to award compensation based on shares. During the crisis, older managers become more risk averse and prefer short-term compensation; therefore, agency theory's assumption of managerial horizon is rejected during a period of instability.

The variable (Tenure) behaves counter to the prediction of the agency theory. Agency theory states that, when the tenure in the executive position in the firm increases, the interests of managers and shareholders are aligned, and the probability of allocating equity-based compensation as a mechanism to reduce conflicts of interest is low. During the crisis, our results support the findings of entrenchment theory. Indeed, Core and Guay (1999) and Tzioumis (2008) assume that a long period of occupation by a manager allows him to take root in the firm and have some influence on the board of directors. Brown and Lee (2010) assume that this mechanism is ineffective in controlling managers' actions during the crisis period, which increases the possibility of managerial entrenchment, and enjoying excessive compensation, especially in the form of shares.

For variables (Dual) and (Bd.Size), we found a positive and statistically significant relation at the 1% level similar to the work of Qin (2012), regardless of the period chosen. This finding is in accordance with the agency theory finding we have previously developed.

The result obtained in the presence of the compensation committee is mitigating and depends on the period analysed. On the one hand, in a context of stability, the compensation committee is effective in controlling the manager (a negative and statistically significant relationship at the 1% level between the variable [Comp.Com] and [Equity.Comp]). This result is consistent with agency theory, which assumes substitutability controls the manager; this explains the negative effect of the presence of the remuneration committee on equity-based compensation (Chang, Labban, Gapin, & Etnier 2012). On the other hand, during the crisis period we find a positive and statistically significant relationship at the 1% level. Therefore, during this period, the compensation committee fails to control equity-based compensation received by the manager, which confirms that during this period the members of the compensation committee and members of the board have a more strategic role than controlling the executive in general and the remuneration of the executive in particular (Brown & Lee, 2010).

Variables related to the percentage of independent directors on the board are ineffective in controlling the manager; their presence is contrary to what is provided by Fich and Shivdasani (2005). Regardless of the time (stability or crisis), such directors may serve on several committees within the firm (audit

committee, compensation committee), which leads to overlap in the directors' functions and therefore, weakens the control actions taken on the manager.

In general, at the economic variables' (related to the characteristics of firms) level, the agency theory is validated regardless of the time when the sample was selected; the exception is variables measuring the liquidity of the company, noise stock returns, and earning returns.

Regarding characteristics related to the manager, with the exception of the variable (Dual), we found results similar to that provided by agency theory; the assumptions derived from agency theory and applied to other variables measuring the age and tenure period depend on the sample and the economic conjuncture.

Regarding variables related to the characteristics of the board, we first demonstrated that the board size is ineffective in controlling the American and French manager, during the two sub periods. This result is similar to agency theory's assumption of. Thus, the compensation committee is effective only during the period of stability, which challenges the disciplinary role of directors during the crisis. Finally, independent directors do not have a supervisory role, but rather a strategic role in both French and American contexts and for a period of stability and crisis. This result is contrary to what is provided by agency theory.

The variable for measuring the concentration of ownership is a negative and statistically significant relationship at the 1% threshold for the stability period and 5% for the period of instability. Indeed, the holders of a large percentage of shares exercise greater control over the executive to eliminate opportunistic behaviour; these investors are unable to diversify their portfolios because of the huge amounts expended by these investors to hold many titles.

The presence of institutional investors during the period of financial stability has a strategic role in strengthening control over the executive, which explains the non-significant relationship between this category of investors and the allocation of share-based compensation as a device of control reinforcement.

For the period of financial instability, which is characterised by a lack of confidence in the financial market, there is a negative and statistically significant relationship at the 1% relationship. Indeed, institutional investors, due to important participation in companies, are more interested in controlling the executive to avoid the possibility of the extraction of private benefits that can lead to negative consequences for the company and for the wealth associated with institutional investors.

CONCLUSION

The objective of developing optimal compensation contracts in general and the allocation of equity-based compensation in particular, is to align manager actions with shareholders' wishes. This type of compensation is a major issue in the debate between researchers and organisations; regulations attempt to explain why firms continue to allocate stock-based compensation despite several scandals related to such compensation. Although this study is a continuation of previous studies that have tried to make a comparative analysis between the market-oriented system and the mixed governance system on the determinants of stock option awards for managers, we tried to go beyond certain limits. In addition, this investigation was one of the first that analysed the validity of the agency theory relative to two markets characterised by a different system of governance and for two different periods (stability and instability).

A two-dimensional analysis of the validity of the agency theory for a sample of 159 French companies and 203 US companies for the period from 2002 to 2010 leads us to conclude that only the variables measuring the size of the firm, growth opportunity, leverage, duality (combining the functions of management and control), the size of the board, and the ownership concentration explained the decision to grant equity-based compensation regardless of the sample and period considered.

Although this study tries to provide a contribution to the literature for previously untreated periods (validity of the theory of agency during the crisis for two systems of governance), it would be interesting to do a comparative study between three systems of governance (American, French, and German-Japanese model) without limiting the range of the crisis to the period of high fluctuation in stock market indices.

NOTES

1. We used a Tobit model because 31% of the total sample did not attribute remuneration in shares. The endogenous variable does not take values below 0.

2. Calculated using the Black and Scholes (1973) taking into account any payment of dividends.

3. According to Yermack (1995) and Tzioumis (2008), the non-distribution of dividends is a proxy for the liquidity constraint of the firm.

4. We integrate a dummy variable (US indicator), taking value 1 if the firm is an American company, 0 otherwise.

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