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The Determinants of Forecast Error Made by CEOs: SBF 120 Evidence

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What is the link between governance and firm' characteristics in forecast error? More specifically, how can female affect analyst forecast? This study sheds light on these questions while taking into account the endogeneity and granger causality test of the relationships among corporate governance and forecast error made by leaders. The authors make more additional contributions about female participation and forecast error to the literature. With a selective selection of the sample by eliminating firms that does not contain a woman in such a leading position, our sample is made up of 83 companies belonging to the SBF 120 index during the period 2010-2014. Our methodology is to estimate the linear regression, which connects the forecast' error to the explanatory variables. The originality of this study focuses on the examination of the women's participation in the explanation of the forecast error committed by the leader in the French context. Our results show that the diversity in the board improves significantly the reliability of the forecasts. Contrary to our hypothesis, the authors found a positive and significant relationship between the female leader and the forecast error. Added to that, the size, age and audit quality are as well are different compared to our assumptions but this is not the case for external directors. Concerning the structure of the undertaking, the results of the three models show a significant and positive impact on the size of the Directors' board and the duality on the forecast error. In this study, the authors proved that the firms belonging to the service sector suffer from a forecast error that is considered very high.

Keywords: Forecast errors, Initial Public Offerings, SBF 120 index, Corporate Governance, Female Participation.

JEL Codes: F37, G34

1. Introduction

The widespread rating of French Initial Public Offerings(IPO) companies to perform their earnings forecasts is a major preoccupation for capital market regulators, as this reflects severally on the quality of companies that go public. IPOs give more chance to new firms to including an earnings forecast in their prospectuses, and specially be more opaque than other public companies. Based only on historical information, investors are moreover face to 'adverse selection'. In other word, they cannot easily distinguish between good and bad investments. However, firm' corporate governance gives a good indication of the IPOs and influence the propensity to make an earning forecast. In light in this view, Cormier et al. (2014) find that companies with better corporate governance are less likely to encompass a voluntary earnings forecast in their IPO prospectus.

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Nevertheless, the heavily skewed distribution of IPOs returns offers the chance to gain extremely high rewards (Green & Hwang, 2011). Potential investors will need sectorial, social and environmental information's. But above all, they need more accurate information about IPO profit forecasts in order to optimize their investment and financing decisions. It's one of the most significant features that can inform investors about the financial situation of the IPO companies.

Analysts' forecasts stand for one of the key voluntary disclosure mechanisms that managers establish. Specially, it affects market earnings expectations, reduces litigation concerns, and influences their reputation for transparent and accurate reporting. The shares of basic literates find influential evidence of management earnings forecasts: affect stock prices (Pownall et al. 1993) and bid-ask spreads (Coller & Yohn, 1997). A broad stream of research suggests that firms who disclosure financial information and earnings announcements reduce the possibility of information asymmetry and give strong impact of benefits investing decisions (Pownall, 1993; Francis, Nanda and Olsson, 2008; Bradshaw et al., 2016).

Depending on the institutional framework of every country, the disclosure of earnings forecast that provide information about expected earnings for a particular firm, is either voluntary (e.g., Malaysia and Tunisia) or mandatory (e.g., Canada, Australia and Europe). Thus, the relevant empirical literature does not provide results on both regulatory regimes (Jaggi, 1997; Dechow et al. 2010 and Horton et al. 2013). Besides, legal and regulatory environments can influence directly voluntary disclosures since laws and judicial interpretations create a less or more litigious environment. Thomas (2002) notice that firms with more informative disclosure policies -as measured by ratings from the Financial Analysts Foundation- have larger analyst followings, less dispersion among individual analysts' forecasts, and less volatility in forecast revisions.

In sum, as investors are unable to assess the accuracy of the forecast information, they tend to rely randomly on management forecasts in valuing IPOs. Of course, management forecasts cannot be verified at the point of provision. But earnings or dividend announcements -subsequent to the release of the forecasts- are important in ex post evaluating the accuracy of these forecasts (Gigler & Hemmer, 1998). How& Yeo (2000) show that management forecast errors are associated with changes in stock price. More importantly, inaccurate forecasts convey the impression that the firm is unstable, leading to the perception of high risk and therefore a lower share price. Prior research also suggests that leaders often issue earnings forecasts to correct information asymmetry problems in order to affect their firm's stock price (Nagar et al. 2003). That's why, having established that management earnings forecasts give value relevant, the authors take automatically to make questions about different' averages of forecast errors and their consequences will be an obvious relevant question.

It is therefore important to identify and to explain the factors inciting the publication of erroneous forecasts by executives, which may affect the credibility of the forward-looking information, contained in the prospectuses for IPOs and capital increases. Added to that, accurate forecasts contribute to market efficiency by mitigating one of the sources of long-run IPOs underperformance. Agency theory literature proposes that executives' reporting incentives and insiders' stock ownership dispose a direct impact on financial reporting quality (Jensen & Meckling, 1976), who is known to be attached to the accuracy of analysts' earnings forecasts (Ota, 2002). Financial publications explain long-term

underperformance of companies introduced on the stock exchange by an excess of optimism of the managers on the future results. Teoh et al. (1998) look into the overstated earning management by accounting adjustment can fool rational investors-which leads to the underperformance in the long-run- when investors adjust the share prices. Barberis & Huang (2008) study the pricing of financial securities in cumulative prospect theory framework. They make proposition: if new security is sufficiently skewed, some investors may choose to hold large undiversified position and are more willing to pay a very high price for the skewed securities. That's why the skewed securities can become overpriced and earn a very low average return, which can explain for the low long-run average return on IPO stocks.

In the context of the publication of forward-looking statements including the disclosure of earnings forecasts, understanding how firm characteristics and corporate governance factors influence the forecast error of future outcomes on the other hand are related. That' presents a key factor in understanding how earnings announcements change investor consensus (Bradshaw et al. 2016). A substantive body of literature exists by focusing on firms' forecasting practices and the factors affecting forecast accuracy.

The main objective of this study is to answer the research question relating to why forecasts significantly deviate from reality. To do this, the authors examine the association between the qualities of management earnings forecast, as measured by management earnings forecast error, and corporate governance attributes as well as firm-specific characteristics in France. Corporate governance attributes examined in this study consist of board of directors' attributes (including board composition, board size and leadership structure -CEO duality-), and auditor quality. This study answers the research question relating to why firms issue lower management earnings forecast quality than do others. This paper investigates the determinants of accuracy and bias of management earnings forecast contained in IPO prospectuses in France. The total sample comprises83 French firms that went public between 2010 and 2014 on Euronext.

The remainder of the paper is organized as follows. Section 2 develops literature review by making based measures of governance and general firm' characteristics and represents our hypotheses. Section 3 describes the data and the measures of variables. Sect. 4 explains the Panel model. Sect. 5 discusses the causality and other specification and diagnostic tests. The authors present the empirical results, debate their implications, and provide alternative specifications for robustness. Section 6 concludes.

2. Literature Review and Empirical Predictions

2.1 Forecasting Error Determinants

Analysts' forecasts have been analysed across several contexts and with respect to numerous proxies for forecasting risk and error. Hypothesised associations have been discussed repeatedly in the literature and the essential arguments are outlined with the hypotheses development, below. Table 1 shows the key studies, the 9 error determinants considered to date, and their significance. With the exception of forecast interval, the more commonly analysed variables have only been sporadically associated with forecast error to a significant degree. Researchers have not identified a set of company; industry or macroeconomic variables that consistently explains IPO forecast error. It is suggested that, alternative firm-specific variables might better capture degrees of uncertainty. This

uncertainty is mainly focused on post-float stream of earnings and on variables developed previously to proxy forecasting, although, risk may prove more robust with finer calibration.

Table 1: Based Measures of the Literature Review

Study	Dev & Webb (1972)	Mak (1989)	Pedwell et al. (1994)	Jaggi (1997)	Chen et al. (2001)	Ajinkya et al. (2005)	Yang & Kao (2007)	Fauzi& Locke (2012)	Gul et al. (2013)
Size of board						✓*	✓*	✓	
Direction duality									
Independent directors							✓		
Female administrator								✓*	✓*
Female leader								✓	
Audit			✓*	✓*	✓	✓	✓		✓*
Size	✓	✓	✓*	✓	✓*		✓*		✓*
Age		✓	✓	✓	✓				
Industry	✓	✓	✓*	✓*					✓*

Note : ✓Variable analyzed in study.
* Significant association with forecast error.

Even though different firms' characteristics have been utilized in prior forecast error research, the governance attributes and their impact have not yet been investigated. Watching table 1, The association between corporate governance and forecast error has been well documented (see, Fauzi & Locke, 2012; Gul, 2013 …). However the association between gender diversity and Analyst forecast is recently examined. After deposing our hypothesis in the next section, the authors will perform series of tests that examine the robustness of our results, which can enrich literature.

2.2 Hypotheses Development

This part of the study discusses the works of literature and develops research hypotheses, which is divided into governance characteristics in the first part and general firms' characteristics in the next part. Figure 1 presents a summary of hypotheses developed.

2.2.1 Governance Characteristics

There is ample literature on the effects of corporate governance on quality of earning forecast. Governance[1] is designed to create the strategic direction to manage companies' risks properly and to use resources effectively. Research has shown that strong corporate governance increases the executives' forecasts quality and motivates a fairly favourable reaction in disclosing reliable forecasts. Corporate governance strength is measured by several factors (board size, leaders control, audit quality) and empirical studies show at best mixed results. On one side, Jensen (1993) found that a large size board could have difficulties to operate effectively and find problems in making major decisions. Besides, it does not give access to its members to adequately control the leader, who may give rise to the domination of the CEOs and cause manipulation and group conflicts. That is, a smaller size board may improve supervision efficiency and a small board of directors -composed of fewer than ten directors - can achieve high performance (Raheja, 2005 and Cai et al. (2014). Another recent survey conducted by Yang & Kao (2007) show that more the size of board is large in size; more the mechanism of corporate governance is effective.

The role of independent directors is quite important in controlling leaders (Ajinkya & Gift, 1984). According to Fama (1993), the presence of independent directors ensures good firm's reputation and good directors' conduct since it diminishes the expropriation of shareholder wealth. Furthermore, Ajinkya et al. (2005) explained that a large proportion of independent directors motivated the leaders to be quite conservative at the time of the forecasts issuance and thus reduce managerial optimism. Byard etal. (2011) and Hribar & Yang (2016)[2] find that analysts' forecast accuracy is positively associated with board independence and negatively correlated with CEO duality and board size. As is common, Carcello & Nagy (2004a) and Carcello & Nagy (2004b) find that CEO duality is positively associated with the probability of financial statement fraud. In addition, Abbott et al. (2000) report a weak positive correlation between CEO duality and the probability of companies attracting SEC sanctions for aggressive reporting or fraud.

Added to that, audit quality is one of the processes that ensure the forecasts disclosure reliability. Lee & Wahal (2004) have found that the choice of a qualified auditor can be held as a signalling mechanism of the reduction of the information asymmetry and of good quality disclosed forecasts. But, Ashbaugh & Pincus (2001) suggest the adoption of IFRS to produce more extensive and informative financial statement disclosures and to reduce choice in accounting standards. Other studies (Bushman et al., 2004; Hili & Affes, 2012 and Jia, 2013) indicated that low information asymmetry reduces the forecasting error, and also, that auditors seek to protect their liability reputation (Lee & Wahal, 2004).Behn et al. (2008) provide evidence that forecast dispersion is higher and forecast errors are larger when audit quality is low. But, as Behn et al. (2008) point out, their study relies on association tests, making it difficult to investigate the causality of the relation. Based on the already said, the audit quality may ensure an information' conservatism and detect not achievable forecasts or those that may negatively influence investors. Added to that, the auditor's rotation reduces his familiarity with the company, which may affect directly the audit liability. According to Davis et al. (2009)[3], the forecast error will be declined when the company has a short agreement with the same auditor.

Gender diversity boosts board attendance and ekes more responsibility for management. The feminization of enterprises is an economic imperative. That's why recent legislation worldwide sound to have more mixed board, to give more chance to women within business leadership. That's true many efforts to including women but the numbers do not match the expectations of equal opportunity between the two sexes (just 2% of female CEO in S&P 350 Euro and is growing slowly to 4% in 2016: Source: S&P Capital IQ Platform). Female CEOs represent also 6.4 % of total in Fortune 500 (Source: http://fortune.com/). The representation of women is better by dint of recent trends (in 2016 USA (19.9 %); Norway (46.7%); France (34.0%), and Sweden (33.6%): sourcehttp://www.catalyst.org/).According to many researchers (Clarke, 2005 and Huse & Solberg, 2006), female participation improves decision process and havea direct relationship on the forecast error. Indeed, Behn et al. (2008)[4] and Gul et al. (2013) have shown that board diversity improves analysts and leaders forecast properties and adds transparency to financial reports. Giving a better functioning of internal governance systems, it seems that women leaders are likely to affect investors' confidence (Adams & Ferrira, 2009). This may be explained by the fact that women CEOs are more risk-averse[5] and conservative than men (Brière & Rinfret, 2010). Empirical evidence by Huang & Kisgen (2013) on US companies has documented that male executives are relatively overconfident compared to female executives. Recall that a large financial literature highlighted the tight links between risk-aversion and forecast error (Epstein, 1991 and

Bliss, 2004). However, Kumar et al. (2017) while examining analysts' earnings forecasts, find that male analysts have lower assessments of firms headed by female CEOs than of firms headed by male CEOs.

H1: Forecast error is positively associated with the size of the board.
H2: Forecast error is positively associated with duality of direction.
H3: Forecast error will be less important with high number of independent directors.
H4: Forecast error is negatively associated with female' participation in board.
H5: Forecast error will be relatively less important with more participation of women leaders.
H6: Forecast error is negatively associated with audit quality.

2.2.2 General Firms' Characteristics

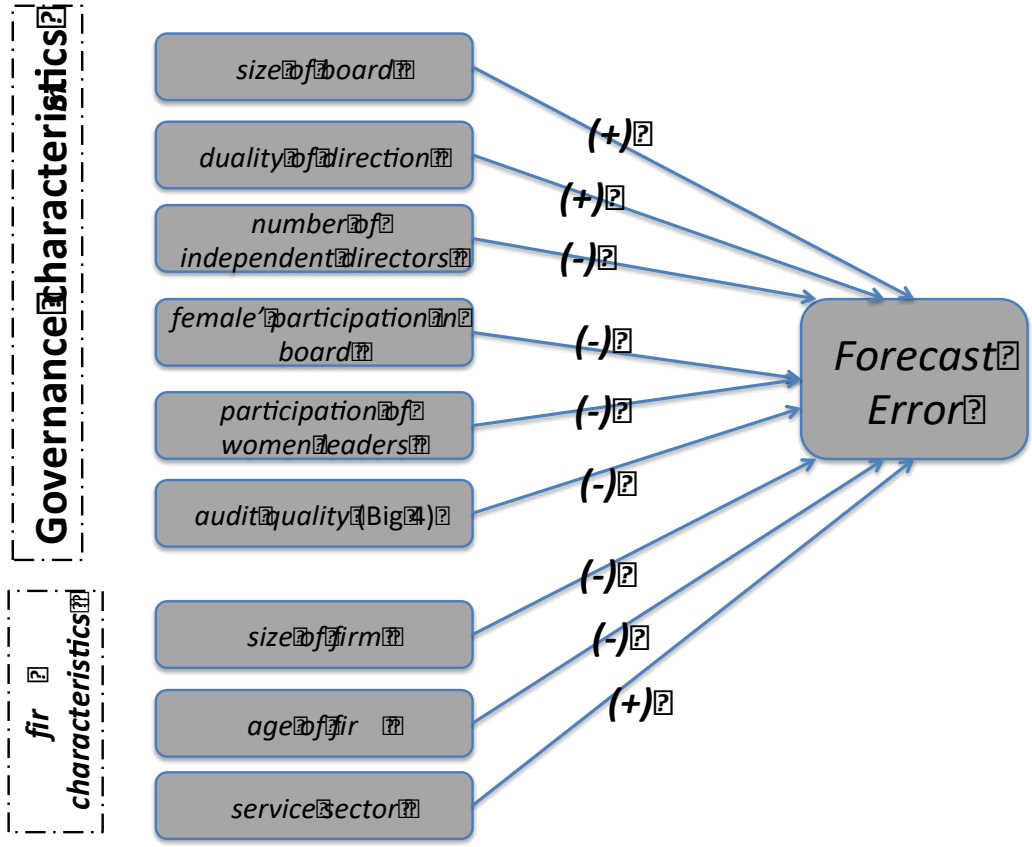
Much of established literature shows that firm characteristics have a direct and significant link with forecast error. The authors narrow the range of plausible interpretations of this strong relationship. Start with Jelic et al.(1998); Choi et al., (2000); Jia, 2013[6] and Gul, 2013), firms' size in an important factor to take into account when assessing forecast accuracy. It have been advanced that, contrary to large firms, small ones tend to issue less reliable forecasts as a result of a limited information. That is larger firms have both financial and human resources to better control their markets and thus to grant high quality forecasts.

Questions about the identification of the link between age of company and forecast errors, authors such as Chapple et al. (2005) explain that big firms have several advantages over small companies that help to estimate their results more accurately such as powerful equipment's and statistical tools, excellent control systems, qualified personnel and specialized leaders. However, other researchers (Gounopoulos, 2003 and Gul, 2013) assume that large firms offer less reliable predictions of outcomes. They tend to issue more optimistic forecasting results, which can directly inflate the forecasting error.

Added to that, the authors investigate in this work the relation between firm size and forecast error. Many authors like Firth and Smith (1992); Gounopoulos (2003) and Jia, (2013) assume that companies with smaller profit have more probability to find difficulty in providing accurate predictions. These companies are not well installed and their leaders have less of historical past results on which they can rely on to prepare their forecasts. More ancient societies experience can lead to improved and higher quality forecasting results (Bédard et al., 2008). Furthermore, each sector is characterized by its own complexity and competitiveness that can make it difficult for companies to issue credible forecasts. For example, according to Jaggi (1997), services and chemistry sectors have difficulties to estimate the future. However, he indicates that the banking sectors, characterized by low results variability, have reliable and similar forecasts among leaders and analysts. As well, according to Karamanou & Vafeas (2005), firms belonging to the new technology sector tend to produce more optimistic forecasts, which may increase the forecasting error. Gounopoulos (2003) compare companies from service sectors (trading services, finance, hotels and properties) with companies from other industries, and finds that CEOs in the industrial sector are more stable and accurate in their estimates. Industrial classification may have an association with the level of forecast accuracy, which report negative sign for service. As an explanation, each industry faces competition and complexity that may make it easier for firms in some industries to forecast more accurately.

H7: Forecast error is negatively associated with size of the firm.
H8: Forecast error is negatively associated with age of the firm.
H9: Forecast error will be more important with service sector.

Figure 1: Summary of Hypotheses Developed



3. Data and Measurement

3.1 Sample

Our initial sample includes all Initial Public Offerings (IPOs) listed in the SBF 120[7] French stock market index for the period from 2010 to 2014. Prospectus and other information's were obtained from the companies' annual financial statements and financial markets regulator (Autorité des Marchés Fianciers, AMF) website. Our sample meet following criteria: (1) some financial institutions were excluded due to the specificity of their accounting rules; (2) the availability of forecasts made by the leaders of our sample and (3)firms must have at least one woman in their list of directors, throughout the entire sample period (5 years): CEO; Chairman; Audit Committee; Nominations Committee or Remuneration Committee (to remind, among our objectives, the study of the relationship between the error of forecasting and the participation of women). The final sample includes 83 companies -371 firm-year observations- from 2010 to 2014.

3.2 Variables Measurement

Several studies that examine analyst forecasts basically in terms of forecast errors(FE) (Cazavan-Jeny and Jeanjean, 2005; Ajinkya et al. 2005; Ota, 2002; Jaggi, 1997and Cai, 2014). Forecast errors are usually measured as the absolute value of the difference

between actual earnings per share (EPS) and mean forecasted EPS, divided by actual EPS:

$$FE_{it} = ln\left|\frac{RR_{it} - RF_{it}}{RF_{it}}\right|$$

With regard to the goal of our study, the authors are not interested in the sign of bias but in its magnitude. Accordingly, the FEformula is preferred since it provides better indication of the degree of the forecasts reliability. Looking the table 7 in the 'Appendix A', much average change in forecast error has been shown between the first year (-14.347%) and the fifth year (-60.317%). Several variations of the independent variable yield an average total equal (-58.909%), which gives practically a clear optimism of the French CEOs giving forecasts far away from the net profit.

Dividing the 5-year sample, table 8 shows the distribution of the first year and the table 9 exhibits the distribution of forecast of the rest of the sample -presented in 'Appendix B'-. Table 8 demonstrates partly equality between forecast and reality (50.62% / 49.38%), which manifest a reducing optimism of CEOs. However, the 2nd 4th year, which respectively gives 71.60% and 71.25%, largely shows the optimism of the CEOs, which gives a probity of the stronger error and a positive and significant impact on the FE_{it}.

The first set of variables to explain the forecasting error accounts for firm's characteristics (the size of the company, the age, the sector of activity). Note that several measures have been developed as proxy to the company, regarded as a major factor of differentiation in assessing the financial constraints impact on the forecast error. For example, the authors find the market value of common equity, the assets, the sales (Vanstraelen et al. 2003) and no employees (Mande & Ortman, 2002).It is clear that there are different measures of the size of the company by examining the forecast error. That is why, in our study, three measures were used. Our analysis also includes variables that reflect the firm governance environment and that may, according to the above literature, affect the forecasting error (the size of the board of directors, the duality of direction, the presence of the independent directors, the participation of women in the board of director, the participation of women leaders and the quality of the audit).Table 2 shows a summary of variables and the data statistics.

Table 2: Summary of Variables and Descriptive Statistics

Variable	Full name	Definition	Mean	SD	Min	Max
FE	Forecasting error	Logarithm of forecasting error	-2.1958	1.6777	-6.4184	4.2446
SBD	Board size	Number of directors in the board.	12.1946	3.554	4	21
DUAL	Duality	Dummy variable equals to1 if there is a combination of two functions and 0 otherwise.	.4033816	.4912	0	1
ADMEXI	Independent director	Ratio of the number of independent administrators to the total number of administrators.	5.8055	2.551	0	13
FEMADM	Female administrators	Ratio of the number of women in the board to the total number of administrators.	3.3498	1.6677	0	0.43
FEMLE	Female leaders	Ratio of the number of women leaders to the total number of leaders (CEO; Chairman; Audit Committee; Nominations Committee or Remuneration Committee).	1.2245	1.2019	0.12	0.36
AUDIT	Audit quality	Dummy variable equals to1 if the auditor belongs to one of the "Big 4" and 0 otherwise. Thus, prior research indicates that firms using Big 5 auditors tend to have better disclosure.	.92754	.25957	0	1
ACT	Total Assets	Logarithm of total of the assets of the company	8.9961	1.5697	3.3809	19.4064
EC	Equity Capital	Logarithm of Equity of the company	7.9676	1.4899	-1.0758	11.3575
TUR	Turnover	Logarithm of Turnover of the company	8.5247	1.6540	-.08338	12.4654
AGE	Age	Number of years that extends from the year of its constitution up to the year of the public call to the savings of the company.	83.9036	63.4335	12	351
SECTOR	Sector	Dummy variable equals to1 if the firm belongs to the service sector and 0 otherwise.	.5075	.5006	0	1

3.3 Econometric Framework

The application of panel data methods became extremely common in finance research (e.g. Cermeño and Grier, 2006[8]).As revealed by Hausman & Taylor (1981), one primary reason for increased utilization of panel data, over time-series and cross-sectional data, is that it accounts for individual heterogeneity. In other words, it allows controlling unobservable individual effects or those difficult to measure. Controlling for unobserved heterogeneity is a fundamental challenge in empirical finance that is unobservable factors may deeply affect corporate policies and prices. For example, basic corporate policies

regard financing or investment will depend on factors that are inherently unobservable like cost of capital, managerial quality, CEOs risk aversion. Failing to control for these group-level heterogeneities can cause serious identification challenges (Gormley & Matsa, 2014[9]; Graham, Li, and Qui, 2011; Coles and Li, 2011).

3.4 Panel Model

The general panel model the authors refer to can be written as follow:

$$Y_{it} = \alpha_i + \sum_{k=1}^{K} \beta_k X_{kit} + \varepsilon_{it} i = 1, \dots, Nt = 1, \dots, T \quad (1)$$

Where$i$denotes the cross-section dimension (firm, state...etc.),$t$indicates the time-series dimension and K is the number of the explanatory variables X. The parameter α_i corresponds to the individual-specific unobserved effects and ε_{it} corresponds to the common error component assumed to be independent and identically distributed (i.i.d) (Cameron& Trivedi, 2009)[10]. To model for individual heterogeneity, individual effects may be either allowed to be correlated with the explanatory variables, which corresponds to the fixed effects model (FE) or be incorporated into the error term and assumed uncorrelated with the right hand side variables. Such structure is known as a random effects model (RE).

$$\begin{aligned} ln(EF_{it}) = \alpha_i + \beta_1 SIZE_{it} + \beta_2 AGE_{it} + \beta_3 SECT_{it} + \beta_4 SBD_{it} + \beta_5 DUAL_{it} \\ + \beta_7 ADMEXi + \beta_8 FEMADM_{it} + \beta_9 FEMLE_{it} + \beta_{10} AUDIT_{it} + \varepsilon_{it} \end{aligned} \quad (2)$$

Recall that three measures of the company size are used. Thus, the variable $SIZE_{it} = (ACT_{it} or EC_{it} or TUR_{it})$.

For best model selection, a battery of specification tests is conducted such as Pooling hypothesis testing known as the test for heterogeneity, RE versus FE, Hausman specification test and Breusch-Pagan Lagrange Multiplier (Greene, 2008). Also, the panel model is estimated assuming idiosyncratic and thus homoskedastic errors. Generally, in the context of panel data, deviation from homoskedasticity occurs likely in the cross-sectional dimension, which results in the so-called group wise heteroskedasticity. A further issue concerns the serial correlation of the idiosyncratic error term. The econometric literature has provided several tests in order to identify the problems encountered in panel data (Wooldridge, 2002; Baltagi &Wu, 1999; etc.).In order to account for these problems, one should estimate the regression model using robust standard errors to heteroskedasticity across panels and serial correlation.

3.5 Endogeneity Issue and Panel Data Granger Causality Test

This study are concerned that equation (2) may be miss-identified if causality runs in the opposite direction mainly with regard to the board of directors' attributes. Indeed, in prior research (Kumar, 2010), it has been proven that female analysts issue bolder and more accurate forecasts and that market participants are aware of their superior abilities. Because investment is tied to forecast accuracy, market participant respond more strongly to the forecast revisions by female analysts. Besides, Lee, Matsunaga & Park (2010) prove that management forecast accuracy affect CEO turnover. Accordingly, the authors

can assume that poor forecasts may result in changing CEO and encouraging the presence of more women leaders since they improve business management.

Consequently, this paper proceeds to evaluate the direction of causality in applying panel Granger-causality tests developed in Holtz-Eakin, Newey and Rosen (1988)[11].Granger-causality tests are obtained by estimating the following VAR system:

$$\begin{cases} \Delta Y_{i,t} = \sum_{k=1}^{p} \alpha_k \, \Delta Y_{i,t-k} + \sum_{k=0}^{p} \beta_k \, \Delta X_{i,t-k} + \varepsilon_{i,t} \\ \Delta X_{i,t} = \sum_{k=1}^{p} \gamma_k \, \Delta X_{i,t-k} + \sum_{k=0}^{p} \delta_k \, \Delta Y_{i,t-k} + v_{i,t} \end{cases} \quad (2)$$

Where Δ is the first difference operator and p represents the lag length[1]; $\varepsilon_{i,t}$ and $v_{i,t}$ are normally distributed error terms for all i and t. If β_k coefficients are jointly significant, an explanatory variable X_k Granger-causes the dependant variable Y, whereas jointly significant $\delta_k$coefficients show that Y Granger-causes X_k.

4. Empirical Results and Discussion

4.1 Causality Relationships

Table 3 below summarizes the results of the Granger-causality testing procedure applied to the variables.

Table 3: The Panel VAR-Granger Causality Test Results

Causal flow	Direct causality	Reverse causality
	Chi2 (p-value)	Chi2 (p-value)
Ln_TUR → ln_FE	4.783 (0.029)	6.625 (0.010)
EC → ln_FE	2.832 (0.092)	1.302 (0.254)
ACT → ln_FE	4.957 (0.026)	2.472 (0.116)
FEMADM→ ln_FE	6.914 (0.009)	2.038 (0.153)
FEMLE →ln_FE	0.323 (0.570)	0.003 (0.958)
SBD → ln_FE	4.624 (0.032)	0.660 (0.417)
DUALITY → ln_FE	1.266 (0.261)	1.778 (0.182)

The first column in table 3 is a Wald test in which the coefficients $\beta_k$in equation 2 are jointly zero. The null hypothesis that $X_k$does not Granger-cause $Y$is rejected for all our explanatory variables except ‘FEMLE’ and ‘DUALITY’.

In the second column, the authors test the reverse causality that is our dependent variable granger-causes a given explanatory variable. When a two-way causal relationship is verified for a given regressor, it might be a source of endogeneity[12]. Fortunately, only one explanatory variable show a feedback relationship. Indeed, the Wald statistics reveal a bi-directional causality between ln_FE and ln_TUR. For the rest, our dependant variable does not granger-causes the remaining explanatory variables.

These results indicate that our model does not suffer from simultaneity bias and no reverse direction estimates are needed.

4.2 Specification and Diagnostic Tests

Firstly, as Baltagi (2013) mentioned, we have to examine the question of whether to pool or not to pool the data. The null hypothesis that intercepts $\alpha_i$are equal across companies which are tested with F test for heterogeneity. The results in table 4 suggest the rejection of the null hypothesis in the three models indicating the presence of the individual effects; that way, panel data estimation is better than a pooled OLS.

Table 4: Fixed Versus Random Effects Models

	Model 1		Model 2		Model 3	
Variable	FE	RE	FE	RE	FE	RE
Ln_TUR	-.172992	.1966799				
ln_EC			-.6764977	-.01242086		
ln_ACT					.27422284	.21148768*
AGE	(omitted)[a]	.00113421	(omitted)[a]	.00197758	(omitted)[a]	.0013851
SECTOR	(omitted)	.44672316	(omitted)[a]	.37652197	(omitted)[a]	.46513024
SBD	.1397954	.05509774	.15392454	.08168399	.13899605	.04879948
DUAL	(omitted)[a]	.71910529*	(omitted)	.59552237	(omitted)[a]	.64228759*
ADMEXT	-.18487839	-.08014267	-.16031183	-.05024726	-.18513359	-.08079402
FEMADM	.0518977	-.02417677	.05886251	-.0320394	.03274802	-.04301176
FEMLE	-.34834179	.13254511	-.36726665	.10727005	-.38549259	.10964444
AUDIT	(omitted)[a]	.46465258	(omitted)[a]	.59583517	(omitted)[a]	.54057458
_cons	-1.1240228	-5.24461***	2.49662	-4.01116***	-4.996798*	-5.36882***
R^2 within	0.0131	0.0033	0.0228	0.0057	0.0174	0.0086
R^2 between	0.0224	0.1430	0.0181	0.1109	0.0004	0.1399
R^2 overall	0.0074	0.0804	0.0060	0.0653	0.0019	0.0889
Wald	0.77	12.54	1.33	9.97	1.03	14.16
(p-value in parentheses)	(0.5728)	(0.1844)	(0.2525)	(0.3531)	(0.4008)	(0.1168)
Fisher poolability test (p-value in parentheses)	3.55 (0.0000)		3.70 (0.0000)		3.54 (0.0000)	
Hausman's test (p-value in parentheses)	3.76 (0.5847)		6.62 (0.2505)		3.80 (0.5778)	
B-P test for random effects (p-value in parentheses)		81.56 (0.0000)		82.48 (0.0000)		78.67 (0.0000)
Number of obs.	371	371	371	371	371	371

* p<0.05; ** p<0.01; *** p<0.001

[a]The fixed effects model omits automatically any time-invariant variable.

Then, the application of the Hausman test to decide between FE or RE models fails to reject the null hypothesis. The study, therefore, concludes that both random and fixed effects estimators are consistent, but random effects estimator is efficient. Besides, we can say that the random model is obviously the best option for our data since fixed effects

models do not estimate time unvarying variables. Finally, we used the Breusch–Pagan LM statistic to decide between a random effects regression and a simple OLS regression. We see that the p-value is inferior to 0.000, which leads us to reject the null hypothesis and to validate the presence of random effects at a level of risk of 1%. However, at this point, all the coefficients are jointly insignificant as showed the Wald-stat (Prob>chi2 higher than 0.05 in the three models). The problem might be due to the existence of serial correlation and/ or contemporaneous heteroskedasticity problems.

Therefore, before interpreting the random effects model results, diagnostic tests for the model assumption must be performed. The most important assumptions of the random effects estimator are homoscedasticity, not serial correlation. Testing for homoscedasticity, result investigate that is performed by using modified Wald test for the null hypothesis of homoscedasticity. Testing for serial correlation is performed using Baltagi-Wu test, modified Bhargavaand .al. Durbin Watson test and Wooldridge's serial correlation test, respectively[13]. Test results are given below in Table 5.

Table 5: Results of the Diagnostic Tests

Test	Hypothesis	Model 1	Model 2	Model 3
		Test Statistic	Test Statistic	Test Statistic
Homoscedasticity				
Modified Wald (p-value)	$H_0: \sigma_i^2 = \sigma^2$	$\chi^2(76) = 9904.16$ (0.0000)	$\chi^2(76) = 6745.65$ (0.0000)	$\chi^2(76) = 6164.03$ (0.0000)
Serial Correlation				
Baltagi-Wu LBI.	$H_0: \rho = 0$	$LBI = 2.1501$	$LBI = 2.14358$	$LBI = 2.1547$
Modif. Bhargavaet.al.	$H_0: \rho = 0$	$DW = 1.6932$	$DW = 1.6810$	$DW = 1.6897$
Wooldridge (p-value)	$H_0: noAR(1)$	$F(1,72) = 8.336$ (0.0051)	$F(1,72) = 9.513$ (0.0029)	$F(1,72) = 8.130$ (0.0057)

Because the Modified Wald test p value is 0.0000, the null hypothesis is rejected and the model has heteroskedasticity. For serial correlation, all tests performed for serial correlation (Wooldridge, Baltagi-Wu LBI and modified Bhargava et al. DW) point that the model has a serial correlation problem. Therefore, we used Feasible Generalized Least Squares (FGLS) popularized by Kmenta (1986) and to deal with our variance-covariance structures which present heteroskedasticity across panels and autocorrelation within panels. Results are presented in table 6.

Table 6: Random Models Accounting for Heteroskedasticity and Serial Correlation

Variable	Model 1	Model 2	Model 3
ln_TUR	.05168039		
ln_EC		-.04801783	
ln_ACT			.18124343**
AGE	.00440321***	.00441348***	.00387532***
SECTOR	.51145809***	.52531642***	.50930359***
SBD	.05553673*	.071515**	.04245238
DUALITY	.38979543**	.36316607**	.38430534**
ADMEXT	-.01593883	.00537991	-.06765157
FEMADM	-.10162081*	-.11243956*	-.0892677
FEMLE	.18903043***	.15930065**	.18346522***
AUDIT	.65372681**	.68348599***	.66984026***
_cons	-4.6012935***	-4.0593008***	-5.3105875***
Wald (p-value in parentheses)	104.90 (0.0000)	84.36 (0.0000)	101.47 (0.0000)
Number of obs.	371	371	371

* p<0.05; ** p<0.01; *** p<0.001

4.3 Final Results and Discussion

Our granger causality test reveals a directional causality between one proxy of the firm size and the forecast error. This result is in line with those of prior research (see Cox, 1985) concerning the endogeneity of the error of forecasts made by the leaders. Hribar & Yang (2016) added to the literature by analyzing the impact of CEO duality on firm performance using a new framework that mitigates the endogeneity problem[14]. This research design mitigates the endogeneity problem caused by reverse causality, namely whether certain board leadership structures enhance firm performance or whether better performing firms tend to adopt certain board leadership structures. In addition, Lawrence et al. (2011) find a causality of the relationship between auditor type and analyst forecasts. Gul (2013) finds an unexplained part of gender diversity in the board explaining most of the variation in properties of earnings forecasts. As a conclusion, it is more likely to be causally linked to gender diversity. Table 6 reports the results of Random models accounting for heteroskedasticity and serial correlation that examine the impact of corporate governance characteristics and other variables on the precision forecasts made by leaders.

Column 6 presents the results examining the relationship between the precision of forecasts disclosure and board size. The results suggest that the propensity to disclose more precise forecasts is positively associated with FE. The respective coefficient of these variables is statistically significant at the 0.05 and 0.01 level, respectively in the M1 and M2 and no significant result in M3. Our results are confirmed by the studies of Jensen (1993) and Byard etal. (2011) and Hribar & Yang (2016). This result can be explained by the fact that the significant number of the board members may increase the capacity for surveillance of the leader, which can contribute to the mitigation of the magnitude of the forecast error. Results duality variables suggest that CEO-Chairman duality affect significantly the forecasting error. The respective coefficient of duality is statistically significant at the 0.01 level respectively three models. We can explain that separate roles give better practice of corporate governance (Carcello & Nagy (2004a) and Carcello & Nagy (2004b)). The results that larger board size and non-CEO duality are positively and

significantly related to making less average of forecasts errors information are consistent with the results of Karamanou & Vafeas (2005).

Presented in column 8, our results don't show an association between the propensity of issuing more independent administrator and analyst forecast in 3 models. This result is inconsistent with Karamanou & Vafeas (2005). Prior results suggest that companies with a greater percentage of outside directors make more accurate and less optimistically biased earnings forecasts (Yang & Kao, 2007 and Ajinkya, 2005). We find in column 11 a positive and significant association between audit quality and forecast error. Thus, H6 is not supported. The respective coefficient of this variable is statistically significant at the 0.01 (M1) and 0.001 (M2 & M3) level respectively. These results are contradictory to Behn et al. (2008); Cahan and al, (2013) and Gul, (2013), who claimed that the big 4 give a clear assurance to the investors and to all the stakeholders to have more precision to the estimate. We may explain this positive association that the auditor is not required to issue an opinion on the reliability of the figures but rather on the coherence and the viability of the assumptions defined as well on the relevance of the methods of calculation adopted.

Results for the female participation in board suggest that the propensity to disclose precise forecasts increases with a higher level of women, meaning that more profitable company are more likely to make less forecast error if they have an important quota of women. The respective coefficient of this variable is statistically significant at the 0.05 levels in the M1 and M2 and no significant result in M3. Thus, hypothesis (H4) suggest that forecast error is negatively associated with female' participation in board, is accepted. This result is consistent with Behn et al. (2008) and Gul (2013) which that the feminization of the board improves the reliability of forecast disclosures and adds transparency to financial reports. Profitable firms with highly quota of female in the board disclose more information to investors in order to send positive signals to capital markets. However, the following hypothesis that suggests that forecast error is negatively and significantly related to the forecast error is contrary to our expectations. Firms with women in the management positions of the company as CEO; Chairman; Director of Audit Committee; Director of Nominations Committee or Director of Remuneration Committee are less likely to make precise forecasts. The significant positive coefficient on FEMLE (at the 0.001, 0.01 and 0.001 level, respectively in the M1, M2 and M3) is contrary to Adams & Ferrira (2009) who submit the capacity of female leader to make more precise forecast and affect investors' confidence. Maybe we can explain this result the relation between female and risk-averse (Davis et al. 2009), that make women more conservative that men. Women in position of directors can take easily high level of risk, and that can create perturbation in company's stakeholders. Added to that the deduction of Kumar et al. (2017), while examining analysts' earnings forecasts. This author suggests that male analysts have lower assessments of firms headed by female CEOs than of firms headed by male CEOs.

The association between firms' characteristics (SIZE, AGE and SECTOR) and analyst forecast gave significant coefficients. For the size, the respective coefficient of this variable is statistically positive and significant at the 0.01 levels in the M3. It takes to say more total assets, more average of forecast error. Thus, H7 is not supported. Our result is different to Ferris and Hayes (1977), Jaggi (1980), Cox (1985), Dastgir et al. (2007), Lemon et al. (2007) and Gong et al. (2009) who find a negative and significant association between forecast error and size of the company. It may be explained that forecast error is important among large firms, which tend curiously to issue forecasts below the achievements. In effect, CEO of large firms publishes forecasts optimistic to

attract investor capital, and to discourage the access of new firms into the market. By using total assets as approximation of size, Jia (2013) find the same result to our result and document that forecast error increases with firm size. The same for Firth and Smith (1992) and Chan et al. (1996), they come up with results support that forecast of smaller companies are more accurate compared to larger companies.

Presented in column 4, our results show an association between age of firms and forecast error (at 0.001 level, respectively in 3 models). This result is different to the findings of preceding studies (Cazavan-Jeny & Jeanjean, 2005 and Bédard et al., 2008) that found a negative and significant association. It can be explained that younger firms have an environment more understanding and more clearly compared to older companies. The changing environment of older firm accentuates respectively the unpredictable climate. More, other conditions not estimable can make CEO in erroneous forecasts based on badly defined assumptions. Per contra, Chen et al. (2001) document that older firms may be viewed as being less risky as they have more experience to draw on when making earnings forecast.For the sector, we show a positive and significant coefficient of the sector variable at 0.001 levels respectively in 3 models. Therefore, our hypothesis that suggests that forecast error will be more important with service sector is accepted. In line of prior research, Gounopoulos (2003) show that the level of results' volatility is very high among companies belonging to the service sector characterized by a state of continuous transformation and facing the occurrence of unforeseen events. Consequently, firms belonging to services sector are likely to make more important errors compared to firms belonging to more stable and predictable activities.

5. Summary and Conclusions

The ultimate goal of this study was to analyse the factors that explain the reliability of forecasts errors made by the leaders in the French context, provided that these firms have at least one woman in a leading position. So, we test 83 listed companies, who respect this condition on the period 2010-2014. According to the existing literature, this paper tries to comprehensively investigate the determining factors of forecast errors committed by the leader on governance and general firm characteristics. This empirical study is the first, to our knowledge, that tried to analyze forecast error with female leader on companies who respect the laws of diversity' encouragement. Furthermore, it complements the international literature concerning two subjects: appreciating the level of reliability of financial forecast published in the prospectus in France and the effect of female participation in company.

The results show that the sector of activity (service), the size of the board and the duality of director has a significant and positive impact. The finding evidences the inefficacy of big size of members in the board and the duality existence on the accuracy of IPO earnings forecasts. The service sector presents the sector difficult to forecast and it gives a strong probability for the error. We find also that women in a board improve the reliability of the forecasts and add more transparency to financial reports (as Gul et al. 2013 results). Differently to our assumptions, we get a positive and significant impact of the size, age of firm, participation of female leaders and audit quality. It cautions that variables do not improve the forecast analyst. For the first variable, the feminization of leaders' positions probably doesn't give the better-estimated function of internal governance systems (differently to Adams & Ferrira, 2009); and this has a direct impact on forecast made by CEOs. For this reason, it can be said that the participation of women in board is preferable

compared to their participation as a leader. Finally, independent administrators have no significant impact in our study and this lack of significance can be explained that having more independent administrators don't have any effect to promote level of accuracy.

Finally, there are certain limits in our study, which recommend directions futures studies. First, we can highlight the conventional limits relating to the choice of variables or to their measures. Second, we have not included control variables at the level of our models in order to examine the link between our independent variable and explanatory variables (all our variables are studied in previous studies). Finally, our results are valid for the French companies and can be generalized to firms in other countries that have partially same legal institutional, structural or cultural attributes; of course, with respect to our condition, in collecting the sample, of the existence of at least one woman in the leading position within the company. Recent research reveals that the number of women board members achieve a new high record in 2017, with 43% in Norway, 41% in France and 37% Sweden (schilling report, 2017).It's encouraging for future studies may examine the impact of female participation on boards and different committees on other performance issues. Further, future research investigations may consider other features of women directors like his level of education or age. Another way can take future research, scholar should explain the behavioural factor to analyse optimistic forecast made by CEOs like the overconfidence (Hribar & Yang, 2016) or narcissism of leaders.

Endnotes

1. Governance is a recent concept (emerged in the 1990s). It refers to the system formed by all the processes, regulations, laws and institutions intended to frame the way the company is managed, administered and controlled.
2. Cai (2014) measures the analyst forecasts error by the difference between actual earnings and the median consensus forecast deflated by the stock price at the end of the corresponding quarter.
3. Davis et al. (2009) verified the link between the company's ability to use discretionary accruals, to meet or exceed analyst's expectations, and audit quality as measured by the auditor's turnover. They concluded a negative relationship between the forecasting error and the auditor's rotation
4. Behn et al. (2008) have indicated that this diversity can improve the ability of the properties of the forecast to 80% in large companies subject to the audit. But, this obviously is not valid in the literature.
5. The term "risk" is explained by the reliability of the forecasts (Claude Francoeur, 2003).
6. Jia (2013) mesure the size of the firm by the natural log of total assets of firm i at the end of the fiscal year t-1.
7. The index is based on the 120 most actively traded stocks listed in Paris.
8. Cermeno, R & Grier, K (2006). Conditional heteroscedasticity and cross-sectional dependence in panel data: an empirical study of inflation uncertainty in the G7 countries. ch. 10, in Baltagi, BH. (Ed): Panel Data Econometrics, vol. 10. *Elsevier, New York, pp. 259– 278.*
9. Gormley, T. & D. Matsa, 2014, 'Common Errors: How to (and Not to) Control for Unobserved Heterogeneity', *Review of Financial Studies,* vol. 27, no. 2, pp. 617-61.
10. Cameron A. C., & P. K. Trivedi (2009), 'Microeconometrics Using STATA. *STATA Press*.
11. Holtz-Eakin, D., W. K. Newey, and H. S. Rosen. 1988, 'Estimating vector auto regressions with panel data',*Econometrica,* vol. 56,pp. 1371–1395.
12. Endogeneity is often used in a broader sense (Deaton, 2010). Wooldridge (2009, 838) defines an endogenous variable as one "that is correlated with the error term, either because of an omitted variable, measurement error, or simultaneity". The authors are using the term "endogeneity" to refer to what Wooldridge calls "simultaneity".
13. According to Baltagi (2013), cross-sectional dependence is a problem in macro panels with long time series (over 20 years). This is not much of a problem in micro panels (few years and large number of cases).
14. Cai (2014) uses an exogenous shock to the competitive environment and relating post-shock firm performance to the pre-shock board leadership structure.

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Appendix A

Overall Average Evolution of the Forecast Error from the First Year

It is interesting to write down the average error by year of publication of the prospectus to judge whether this relative reliability varies from one year to another.

Table 7: Average Change in Forecast Error for the First Year

Year	Forecast number	Average
2010	81	-14.347%
2011	81	-144.66%
2012	81	-54.759%
2013	80	-20.465%
2014	80	-60.317%
Total	403	-58.909%

Figure 2: Evolution of the Average Error of the First to the 5th Year of Forecast

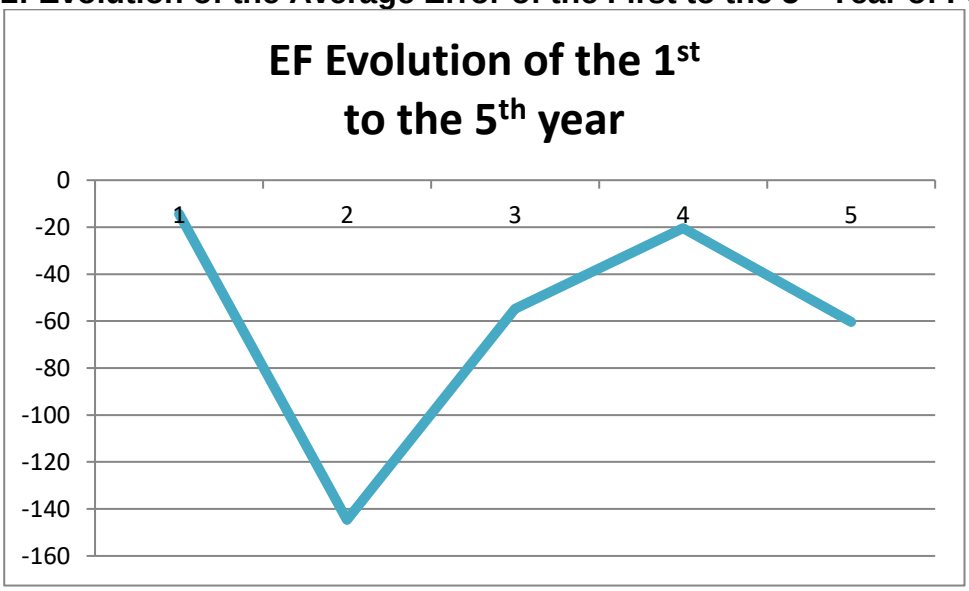

Table 7 and Figure 2 show a significant discrepancy in reliability over time. Indeed, the first year is marked by a slightly pessimistic trend with an average that does not exceed (-20%). However, the second year and the third year (2011 and 2012) are marked by a largely optimistic trend (respectively -144.66% and -54.759%). The listed French companies published pessimistic forecasts during 2013. But, they ended up following the following year (2014) an optimistic trend with an average exceeding -60%.

Appendix B

Distribution of Forecast Error from First to Last Period

Table 8: Distribution of (EF) for the First Year

Interval FE (%)	Number	(%)
FE> 90	1	1.23
50< FE≤90	1	1.23
40< FE≤50	2	2.47
30< FE≤40	1	1.23
20< FE≤30	4	4.94
10< FE≤20	7	8.65
0< FE≤10	25	30.87
-10< FE≤0	21	25.94
-20< FE≤-10	6	7.41
-30< FE≤-20	3	3.70
-40< FE≤-30	1	1.23
-50< FE≤-40	1	1.23
-60< FE≤-50	1	1.23
-100< FE≤-60	2	2.47
-250< FE≤-100	4	4.94
FE< -250	1	1.23
Total	81	100
Result Net > Forecast Error	41	50.62
Result Net < Forecast Error	40	49.38

This table shows that 49.38% of the sampled companies published in the first year forecasts higher than the realizations while 50.62% published forecasts that proved to be lower. The trend that carries the leaders of French companies is neither optimistic nor pessimistic because the percentages are almost identical. However, we observe that the highest percentage (30.87%) represents forecasts in the range of [0.10]. In addition, nearly 57% of companies have a forecast gap in the range of ± 10. This first proportion is 55% in Canada, 67% in Hong Kong, 46% in Malaysia, 5% in the United Kingdom and 8% in Australia, according to the previous literature indicated in this paper.

Table 9: Distribution of Forecast Discrepancies for the Second To Fifth Year

	Year 2		Year 3		Year 4		Year 5	
Interval FE (%)	**Number**	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**
FE>90	0	0%	0	0	1	1.25%	1	1.25%
50< FE≤90	1	1.23%	0	0	1	1.25%	2	2.50%
40 < FE ≤50	0	0%	2	2.47%	0	0%	0	0%
30< FE≤40	0	0%	2	2.47%	1	1.25%	1	1.25%
20 < FE≤30	3	3.70%	0	0	0	0%	4	5%
10 < FE≤20	6	7.41%	6	7.41%	3	3.75%	7	8.75%
0 < FE≤10	13	16.05%	17	20.99%	17	21.25%	13	16.25 %
-10 < FE≤ 0	29	35.80%	19	23.46%	28	35%	19	23.75 %
-20 < FE≤-10	7	8.65%	9	11.11%	5	6.25%	11	13.75 %
-30< FE≤-20	7	8.65%	5	6.17%	6	7.50%	4	5%
-40 < FE≤ -30	2	2.47%	3	3.70%	4	5%	3	3.75%
-50 < FE≤ -40	3	3.70%	1	1.23%	0	0%	0	0%
-60 < FE≤-50	1	1.23%	2	2.47%	2	2.50%	0	0%
-100 < FE≤-60	2	2.47%	3	3.70%	6	7.50%	6	7.50%
-250 < FE≤-100	4	4.94%	8	9.88%	5	6.25%	6	7.50%
FE<-250	3	3.70%	4	4.94%	1	1.25%	3	3.75%
Total	81	100%	81	100%	80	100%	80	100%
Result Net>Forecast Error	23	28.40%	27	33.33%	23	28.75%	28	35%
Result Net<Forecast Error	58	71.60%	54	66.67%	57	71.25%	52	65%

This Table 9 shows a very important disparity between the different intervals of the forecast error during the first year. The interval of [-10, 0 [is the largest in the first year. The 2nd year represents a very important disparity between the different intervals of the error of forecasts during the second year. The interval [-10, 0 [is the most important. During the third year, the interval of ∓10 is the largest in this sample of French context. Indeed, the interval [-10, 0 [and [0, 10[represent respectively 23.46% and 20.99% of forecast errors. The 4th year represents a very important disparity between the different intervals of the forecast error during the fourth year. The interval [-10, 0 [is the most important. In the fifth year, the interval [-10, 0 [is the largest (as in all years except the first year). Table 9 represents a significant disparity between the different intervals of the forecast error.