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Impact of Corporate Governance on American Corporates' Financial Performance: The Mediating Role of Derivatives

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ABSTRACT

This study aims to present and test a model that derivatives (commodity, currency, and interest rate) play a mediating role between corporate governance and financial performance. We tested this model through a sample of 85 non-financial American corporates listed in New York Stock Exchange, U.S. 100 Index for six years from 2009-2014 by applying Partial Least Square, Structural Equation Modeling. We confirm that derivatives usage plays a mediating role between corporate governance and financial performance. We found and recommend that the utilization of derivatives as a risk management tool is essential for corporates to improve financial performance. Finally, the findings are useful for corporates from developed (European), emerging (China), and developing (Pakistan, Bangladesh) countries to utilize derivatives to hedge risk and improve financial performance.

JEL Classification: *G34, G3, D22*

Keywords: *Risk Management, Hedging, Derivatives, Corporate Governance*

INTRODUCTION

Significant foreign direct investment through multinational corporates is a result of the globalization. Corporates are key players around the world and deal with several countries and currencies. The strong corporate governance and risk management mechanism is essential for national and multinational corporates to survive and improve financial performance (Prevost, Rose, & Miller, 2000). The corporate governance has gain attention after considerable losses to big corporates such as Enron, Harris Scarfe, One. Tel, WorldCom, and Andersen. In the United States of America, the corporate governance became famous after the scandal of Watergate (the 1970s). As a result, the Sarbanes –Oxley Act 2002 and Dodd-Frank Act 2010 is passed in the US.

The association between the corporate governance and corporates financial performance is studied by several researchers (Jiang & Zhang, 2018; Nawaz & Ahmad, 2017; Paniagua, Rivelles, & Sapena, 2018; Yilmaz, 2018; Shahwan, 2015). Most researchers found that corporate governance is essential and impacts positively towards the financial performance of the national and multinational corporates.

Further, the multinational corporates face a different type of risk, such as commodity prices, foreign currency, and interest rate risk while doing operations around the world. It is essential for the multinational corporates to have a sound risk management system to overcome these risks. The derivatives have a positive impact on financial performance (Erez-gonz, 2013; Donohoe, 2015; Kim, Papanastassiou, & Nguyen, 2017; Bae, Kim, & Kwon, 2018; Bahoo,

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Khan, & Ahmad et al., 2018). The utilization of three types of derivatives; currency, commodity, and interest rate are primary tools of risk management policy. However, several managers use derivatives contracts for speculation or for their benefit instead of the corporate that lead to the agency problem. It is emphasized that corporate governance is mandatory for efficient and appropriate use of derivatives by reducing agency problem (Allayannis et al., 2012).

Up till now, the causal effect of two variables is studied; such as corporate governance to financial performance (Nawaz & Ahmad, 2017), corporate governance to risk management through derivatives usage (Adams et al., 2011), and risk management through derivatives usage to financial performance (Bahoo et al., 2018). However, a combined study on these three variables is conducted by the following two researchers. First, Allayannis et al. (2012) merely used corporate governance as a conditional variable where corporate governance is active derivatives usage add more value and vice versa. In another study by Aebi et al. (2011), they concluded that risk management has a positive impact on financial performance, but there is no association between corporate governance and financial performance during the crisis 2007-2008.

In this study, we want to extend the work of Bahoo et al. (2018) by examining the mediating role of derivatives between corporate governance and financial performance. We examined this model on American corporates. Our study is unique due to several aspects. First, this study tests the mediating effect of derivatives usage between corporate governance and financial performance. We test mediation based on criteria and theory of Helm et at. (2010), and Baron and Kenny (1986) because it is considered as a most appropriate way of analyzing the mediation through Structural Equation Modeling (Iqbal et al., 2017; Raj, 2018; Wo, Cheng & Ai, 2017). Second, we examine the American corporates listed in New York Stock Exchange (NYSE)-US 100 Index from 2009-2014 by following Bahoo et al. (2018).

The sample of the study is unique as these 100 American corporates cover 36% of the market capitalization of the NYSE (NYSE, 2018). Third, to avoid the effect of economic and financial crises effect, we choose a period of study between 2009-2014 (Bahoo et al., 2018). Fourth, we applied Partial Least Square, Structural Equation Modeling (PLS-SEM) to examine this model (Iqbal et al., 2017; Fiksenbaum et al., 2017).

Our study has multiple findings. First, we found that corporate governance has a positive association with the financial performance during 2009 to 2014 same as per findings of Jiang and Zhang (2018). Second, our analysis shows that corporate governance has an impact on the proper utilization of the derivatives usage by managers to reduce the agency problem for six years, like Clark and Meftah (2010). Third, we found that derivatives have a positive effect on financial years from 2010 to 2014 but not in 2009. This result is like our precious study Bahoo et al. (2018). Forth, we found that derivatives play mediating role in years 2014, 2013, 2010, 2011 and unable to play in 2012 and 2009. The reason behind the no mediation effect in 2012 and 2009 is the financial crises of 2007-2008 and Euro-Zone crisis 2012 (Erkens et al., 2010; Eurozone crisis explained, 2012). Because the positive effect added by derivatives to minimize the risk has nullified by these crises, and our hypothesis gets rejected in 2009 and 2012.
The rest of the articles organizes as follows: section 2 explains the literature review and theoretical model, and section 3 presents the methodology and data analysis. Section 4 shows the discussion and conclusion.

LITERATURE REVIEW AND THEORETICAL MODEL

Corporate Governance

The relationship between corporate governance and financial performance is checked by Nguyen et al. (2015) during the financial crises 2007-08 and concluded that corporate governance played a proper role and saved firms from adverse shocks. In the U.S the corporate governance is a vital topic of study and Sarbanes –Oxley, Act, 2002 and Dodd-Frank, Act, 2010 are implemented to reduce the agency problem.

Derivatives Usage

The use of derivatives as a risk management tool is one of the essential techniques that corporates use in an era of globalization that minimize risk and increase firm value (Bessembinder, 1991; Nguyen, Kim, & Papanastassiou, 2018). In U.S. corporates is one of the essential users of derivatives around the world and U.S. derivatives market has improved up to $ 308 trillion in 2012 and almost equal to double of U.S. GDP as reported by Bank of International Settlements.

Financial Performance

The financial performance is a critical indicator that a business is working well, and different proxies are used by various researchers for financial performance (Bae, Kim, & Kwon, 2018). The selection of unbiased indicators to measure financial performance is significant.

Corporate Governance and Financial Performance

Connelly, Limpaphayom, and Nagarajan et al. (2012) examined the relationship between the corporate governance and firm value of Thai-firms and concluded that good corporate governance adds in firm value. Yang and Zhao (2014) also conducted a study on Canadian and U.S corporates by using 1989 Canada-United State Free Trade Agreement as shock and found that corporates with CEO duality outer perform as compared to non-dual and concluded that corporate governance has a positive impact on firm value. Many researchers found a positive relationship (Chhaochharia & Grinstein, 2007; Ferrer & Banderlipe, 2012; Paniagua et al., 2018; Yilmaz, 2018) and some found the opposite (Velnampy, 2013). We draw our first hypothesis as;

H1: Corporate Governance is positively and significantly related to Financial Performance.

Corporate Governance and Derivatives usage

Corporate Governance and risk management had been discussed side by side in the early years especially, after a default of big companies such as Bear Stearns and Lehman Brothers. According to a survey of the World Bank in 2004 good corporate governance plays a vital role while managing the risk effectively (Adams et al., 2011). Lel (2012) studied 30 countries and concluded that for proper utilization of derivatives and avoid agency problem good corporate governance is a must. In the U.S., it is likely that manager use derivatives for a personal reason instead of hedging (Bodnar & Marston, 1998) and good governance are required. Thus, the following hypothesis has been formulated;

H2: Corporate Governance is positively & significantly related to Derivatives usage.

Derivatives usage and Financial Performance

Recently, Bahoo et al. (2018) analyzed the effect of derivatives usage on financial performance on American corporates and found positive effects. Similarly, Allayannis and Weston (2001) examined 720 non-financial U.S corporates and found a positive impact on firm value. The hedging of risk through derivatives add premium and improve firm value (Fok, Carroll, & Chiou, 1997; Clark & Meftah, 2010), and few researchers also have contrary findings (Fok et al., 1997; Ayturk, Gurbuz &Yanik, 2016). In light of previous studies, the following hypothesis designed.

H3: The Derivatives usage is positively & significantly related to financial performance.

Corporate Governance, Derivatives usage, and Financial Performance

There are few studies which examine these three variables together. First, Aebi et al. (2011) which examine a relationship among risk management, corporate governance, and performance during crises of 2007-08. They recommended that corporates with substantial risk related governance have excellent performance and vice versa. Second, Allayannis et al. (2012) used corporate governance as a conditional variable and found that where corporate governance is strong derivatives add more premium as compared to the weak governance of corporates. Third, Ahmed et al. (2012) find that risk management and corporate governance are interlinked to improve performance. Finally, the three variables, such as derivatives as a risk management tool, board effectiveness as corporate governance's part, and firm value are tested together on a sample of Australian corporates by Kommunuri et al. (2014).

Therefore, the limited research work on these variables and literature support enabled the researcher to conceptualize a new theoretical model that derivatives play a mediating role between corporate governance and financial performance (See Figure 1). We developed the following hypothesis.

H4: Derivatives usage work as mediator between Corporate Governance and Financial Performance.

The list of hypothesis and details of variables are given in Tables 1 and 2.

Table 1: List of Hypothesis

Hypothesis	Description	Codes
H1	Corporate Governance is positively and significantly related to Financial Performance.	(CORP_GOV → FIN_PERF).
H2	Corporate Governance is positively & significantly related to Derivatives usage.	(CORP_GOV → DERV)
H3	The Derivatives usage is positively & significantly related to financial performance.	(DERV → FIN_PERF)
H4	Derivatives usage work as mediator between Corporate Governance and Financial Performance.	(CORP_GOV → DERV → FIN_PERF)

Note: Table 1 shows the list of hypotheses developed by the authors to check the mediating role of derivatives between corporate governance and financial performance based on the criteria of Helm et at. (2010) and Baron and Kenny (1986).

Table 2: Details of Variables

Construct	Indicator	Code	Symbol	Measurement	Reference
Latent Exogenous Corporate Governance (CORP_GOV) Symbol: ξ	1-Board Meeting (BRD_MEET)	CG1	γ_{x1}	No of Board Meetings	(Shan, 2013)
	2- Female Director (FEMALE_DR)	CG2	γ_{x2}	No of Female Director	(Faleye, 2007)
	3-Audit Committee (AUDIT_COM)	CG3	γ_{x3}	No of audit committee members	(Gupta & Sharma, 2014)
	4-Compensation Committee (COMPEN_COM)	CG4	γ_{x4}	No of compensation committee members	(Black & Kimb, 2012)
	5-Management Remuneration (MG_REMUN_LN)	CG5	γ_{x5}	Natural Log of Management Remuneration in term of U.S Dollars	(Makki & Lodhi, 2013),
Proposed Mediating: Derivatives (DERV) Symbol: μ	1-Commodity Derivatives (COMD)	DERV1	γ_{m1}	Dummy variable, if Company use 1 otherwise 0	(Bartram et al., 2011)
	2- Foreign Currency Derivatives (FCD)	DERV2	γ_{m2}	Dummy variable, if Company use 1 otherwise 0	(Allayannis et al., 2012)
	3-Interest Rate Derivatives (IRD)	DERV3	γ_{m3}	Dummy variable, if Company use 1 otherwise 0	(Allayannis et al., 2012)
	4-Derivatives to Asset (DERV_ASSET)	DERV4	γ_{m4}	Derivatives /total Assets	(Hentschel & Kothari, 2001)
Latent Endogenous Financial Performance (FIN_PERF) Symbol: η	1-Return on Equity (ROE)	FP1	γ_{y1}	Net Income/Equity	(Kima et al., 2009)
	2- Earnings Per Share (EPS)	FP2	γ_{y2}	Earnings Available for Common Stockholders/No of common shares outstanding	Ahmed et al. (2012)
	3-Tobin Q (TOBINQ)	FP3	γ_{y3}	Total Book Value of Assets-Book Value of Equity + Market Value of Equity/Total Book Value of Assets.	(Allayannis et al., 2012; Shan, 2013)
Financial Performance			φ	This sign represents financial performance after the impact of derivative usage in H3.	
Random Disturbance Term			ε_j	Distarbance term in the SEM model.	

Note: The table shows the details of the variables, author collection.

Theoretical Model

We follow the criteria of Helm et at. (2010) and Baron and Kenny (1986) to confirm the mediation and test hypothesis from H1 to H4 by applying Partial Least Square, Structural Equation Modeling (PLS-SEM) which is a suitable technique in finance (Fornell, 1984). We used PLS-Smart 3.0 software for our analysis of six years from 2014 to 2009. One of the key advantages of PLS-SEM is that it does not require the non-normality of data (Hair et al., 2012). Further, we consider the constructs are formative because according to Hair et al. (2009) mostly finance and business construct are formative. Moreover, the formative indicators are non-correlated (Chin, 1998), and Cronbach Alpha is not required for formative constructs (Bollen, 1989). We present our PLS-SEM and theoretical model in Figure A below.

Partial Least Square, Structural Equation Modeling

The PLS-SEM analysis consists of two models; (i) measurement model and (ii) structural model. The details of the models are as follows.

(i) Measurement Model: The measurement model of latent constructs in mathematical term;

$$\xi = \gamma x1X1 + \gamma x2X2 + \gamma x3X3 + \gamma x4X4 + \gamma x5X5 + \varepsilon 1$$

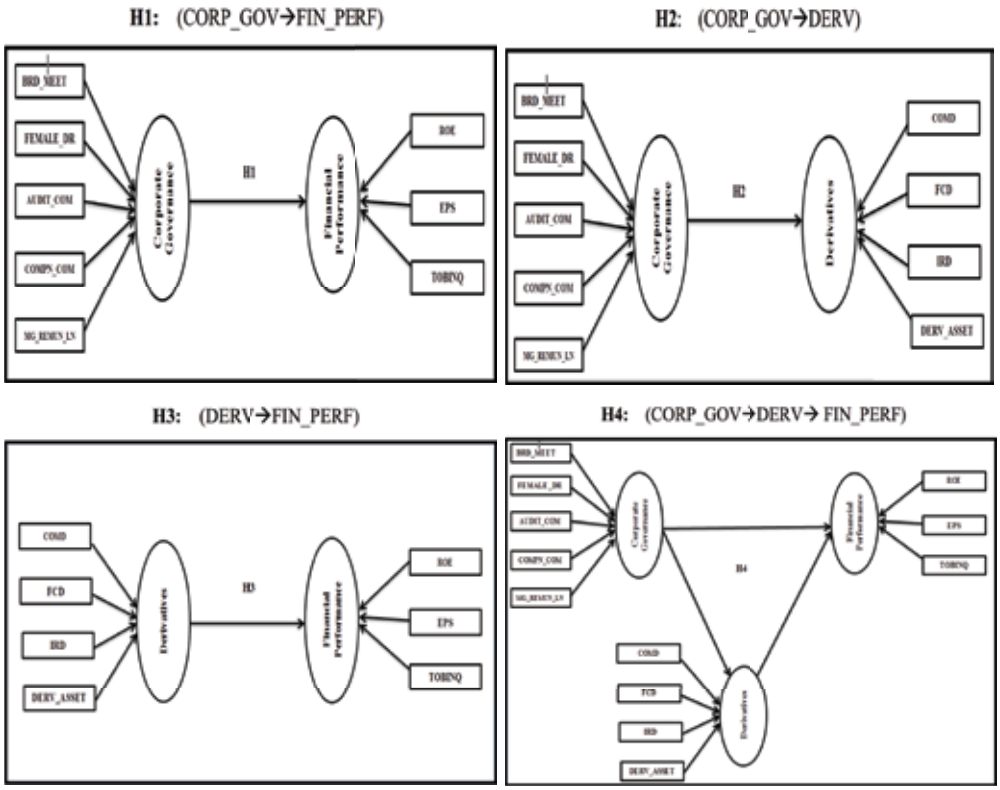
$$= \gamma m1M1 + \gamma m2M2 + \gamma m3M3 + \gamma m4M4 + \varepsilon 2$$

$$\eta = \gamma y1Y1 + \gamma y2Y2 + \gamma y3Y3 + \varepsilon 3$$

(ii) Structural Model: The four hypotheses, H1 to H4 are presented in mathematical term;

$$H1: \eta = \beta_{0(1)} + \tau\xi + \varepsilon_1$$
$$H2: M = \beta_{0(2)} + \alpha\xi + \varepsilon_2$$
$$H3: \phi = \beta_{0(3)} + \alpha\xi + \beta_1 M + \varepsilon_3$$
$$H4: \eta = \beta_{0(4)} + \tau\xi + \beta_1 M + \beta_2\phi + \varepsilon_4$$

Table 3: Details of Variables



METHODOLOGY AND DATA ANALYSIS

We follow the criteria of Helm et at. (2010), and Baron and Kenny (1986) to confirm the mediation and test hypothesis from H1 to H4 by applying Partial Least Square, Structural Equation Modeling (PLS-SEM). We present the details of our methodology below.

Sample Characteristics, Selection and Data Collection

NYSE is one of the world largest exchange has a market capitalization in May 2015 is 19.69 trillion dollars. The NYSE U.S. 100 Index selected for this study because NYSE has its own corporate governance rules and guidelines for the listing of companies. The financial corporates excluded because they have motives of speculations and trading of derivatives, yet the study sample size was confined to 85 and the number of observations was 6120. This study is based on quantitative secondary data of six years from 2009 to 2014, published annually. The data collected from the proxy statement (DEF 14A), annual reports (Form 10-K) and Market Watch database.

Data Analysis

According to assumptions of PLS-SEM the different tests are performed to confirm the relationship presented in this study.

Descriptive Statistics

The descriptive statistics results are given in Table 3. The average values of board meetings and management remuneration reflect the importance of corporate governance for U.S. corporates. Moreover, reasonable mean values of derivatives to asset ratio show that a considerable number of derivatives contracts used corporates as a hedging tool.

Multicollinearity among constructs

The multicollinearity among formative constructs creates the problem of unstable weights and must be eliminated and checked through the Variance Inflation Factor (VIF) (Cenfetelli & Bassellier, 2009) as given in Table 4. According to Kleinbaum et al. (1988), the VIF value should be less than 10.

Multicollinearity among indicators

The multicollinearity among indicators checked through bivariate correlation, and all indicators have less than 0.90 correlations, as given in Tables 5 to 10. If the correlation coefficient is greater than 0.90, multicollinearity exists among indicators (Tabachnick & Fidell, 1996; Pallant, 2002).

Table 4. Test of Multicollinearity Among Constructs (VIF)

Indicator Code	2014				2013				2012				2011				2010				2009			
	Min	Max	Mean	S.D	Min	Max	Mean	S.D	Min	Max	Mean	S.D	Min	Max	Mean	S.D	Min	Max	Mean	S.D	Min	Max	Mean	S.D
CG-1	75	100	81.81	9.54	75	100	81.27	9.12	75	99	81.09	9.03	75	99	81.33	9.23	75	98	81.62	9.39	75	98	81.13	8.95
CG-2	1	5	2.56	0.98	1	5	2.59	0.99	0	5	2.45	.97	0	5	2.47	0.98	0	5	2.36	0.96	1	5	2.31	0.9
CG-3	1	8	4.71	1.07	3	7	4.61	1.03	3	9	4.68	1.11	3	8	4.67	1.04	3	8	4.61	1.04	3	11	4.68	1.29
CG-4	0	6	4.26	1.27	0	7	4.28	1.33	0	9	4.39	1.42	0	8	4.52	1.51	0	8	4.36	1.53	0	8	4.31	1.52
CG-5	15.33	18.71	17.82	0.52	15.13	18.95	17.75	0.53	15.30	18.72	17.75	0.57	16.12	18.80	17.77	0.50	15.59	18.88	17.75	0.50	16.24	18.94	17.65	0.46
DERV-1	0	1	0.33	0.473	0	1	0.34	0.47	0	1	.34	.477	0	1	0.34	0.47	0	1	0.34	0.477	0	1	0.31	0.46
DERV-2	0	1	0.72	0.45	0	1	0.73	0.44	0	1	.74	.441	0	1	0.76	0.42	0	1	0.75	0.434	0	1	0.75	0.43
DERV-3	0	1	0.69	0.46	0	1	0.69	0.46	0	1	.71	.458	0	1	0.71	0.45	0	1	0.69	0.464	0	1	0.67	0.47
DERV-4	0.0	8.50	0.79	1.40	0	8.04	0.72	1.26	0.0	8.66	0.65	1.31	0	7.58	0.63	1.21	0	8.53	0.61	1.25	0	7.38	0.57	1.04
FP-1	0.67	73.52	19.57	15.32	1.72	82.35	23.38	17.24	2.58	68.84	19.57	12.37	0.10	70.88	21.07	15.39	0.09	71.88	21.07	14.59	1.09	68.06	20.97	14.52
FP-2	0.10	10.12	2.90	1.88	0.08	9.53	3.36	1.89	0.43	9.72	3.77	2.148	0.02	14.88	3.91	2.88	0.06	9.84	4.28	2.36	0.61	12.72	4.35	2.69
FP-3	0.57	9.28	1.79	1.09	0.51	5.61	1.811	0.83	0.52	5.011	1.73	0.80	0.50	4.57	1.75	0.81	0.49	4.63	1.95	0.92	0.52	5.58	2.19	1.07

Note: The table shows the descriptive statistics, authors calculation.

Table 5. Test of Multicollinearity Among Constructs (VIF)

Constructs	2014			2013			2012			2011			2010			2009		
	CORP_GOV	DERV	FIN_PERF	CORP_GOV	DERV	FIN_PERF	CORP_GOV	DERV	FIN_PERF	CORP_GOV	DERV	FIN_PERF	CORP_GOV	DERV	FIN_PERF	CORP_GOV	DERV	FIN_PERF
CORP_GOV	-	1.000	1.213	-	1.000	1.248	-	1.000	1.273	-	1.000	1.174	-	1.000	1.287	-	1.000	1.098
DERV	-	-	1.213	-	-	1.248	-	-	1.273	-	-	1.174	-	-	1.287	-	-	1.098
FIN_PERF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: The table presents the result of Multicollinearity among construct, author calculation.

Table 6. Correlation Test Matric (2014)

No	Indicator Code	1	2	3	4	5	6	7	8	9	10	11	12
1	CG-1	1											
2	CG-2	0.15	1										
3	CG-3	0.065	0.069	1									
4	CG-4	0.148	-0.16	.229*	1								
5	CG-5	0.083	-0.02	0.05	-0.2	1							
6	DERV-1	0.191	0.107	0.122	0.213	0.11	1						
7	DERV-2	0.153	0.068	0.023	0.19	-0.01	0.106	1					
8	DERV-3	.240*	0.044	0.151	.236*	0.142	.248*	.434**	1				
9	DERV-4	0.191	-0.18	-0.02	0.133	0.035	0.16	0.145	.252*	1			
10	FP-1	0.208	0.119	0.064	0.107	-0.05	0.151	0.127	.323**	.301**	1		
11	FP-2	0.139	0.157	0.107	0.164	-0.09	0.058	0.018	.253*	0.102	.347**	1	
12	FP-3	.244*	.256*	-0.1	0.024	-0.1	0.156	0.085	-0.07	-0.01	0.131	-0.01	1

Table 7. Correlation Test Matric (2013)

No	Indicator Code	1	2	3	4	5	6	7	8	9	10	11	12
1	CG-1	1											
2	CG-2	0.047	1										
3	CG-3	0.052	0.19	1									
4	CG-4	.249*	-0.01	0.167	1								
5	CG-5	0.104	0.137	0.028	-0.06	1							
6	DERV-1	.219*	0.074	0.079	.277*	0.112	1						
7	DERV-2	0.176	0.149	0.028	0.11	-0.02	0.103	1					
8	DERV-3	0.18	0.111	.221*	0.141	0.151	0.208	.458**	1				
9	DERV-4	0.187	-0.11	0.178	.232*	0.081	0.112	0.084	.279**	1			
10	FP-1	0.105	0.176	-0.05	0.101	0.014	0.077	0.026	0.198	0.06	1		
11	FP-2	0.077	-0.1	0.043	0.117	0.113	.223*	-0.08	0.137	0.111	0.075	1	
12	FP-3	0.206	0.135	-0.12	-0.05	-0.08	-0.04	-0.02	0.064	-0.09	.383**	-0.16	1

Table 8. Correlation Test Matric (2012)

No	Indicator Code	1	2	3	4	5	6	7	8	9	10	11	12
1	CG-1	1											
2	CG-2	0.032	1										
3	CG-3	0.107	-0.01	1									
4	CG-4	.269*	-0.067	.469**	1								
5	CG-5	0.145	0.117	0.115	0.101	1							
6	DERV-1	0.164	0.027	0.072	.241*	0.189	1						
7	DERV-2	.219*	0.079	0.194	0.048	0.003	0.085	1					
8	DERV-3	.274*	0.165	.234*	0.195	0.088	.247*	.444**	1				
9	DERV-4	0.183	-0.098	.356**	.346**	0.13	0.154	0.036	.251*	1			
10	FP-1	-0.009	.232*	-0.09	-0.009	0.001	-0.027	0.036	0.122	-0.131	1		
11	FP-2	0.176	-0.087	0.055	.265*	0.115	0.147	-0.148	0.114	0.181	0.116	1	
12	FP-3	0.192	0.065	-0.048	0.11	0.045	0	-0.015	0.017	-0.092	.301**	-0.001	1

* Level of Sig. at 10% (1.645) ** Level of Sig. at 5% (1.96) *** Level of Sig.at 1% (2.576)

Table 9. Correlation Test Matric (2011)

No	Indicator Code	1	2	3	4	5	6	7	8	9	10	11	12
1	CG-1	1											
2	CG-2	-0.07	1										
3	CG-3	-0.034	0.025	1									
4	CG-4	0.135	-0.093	.381**	1								
5	CG-5	0.11	.271*	0.031	-0.027	1							
6	DERV-1	0.182	-0.042	0.085	0.164	0.158	1						
7	DERV-2	.301**	0.012	0.199	0.135	-0.078	0.107	1					
8	DERV-3	.313**	0.126	.219*	0.187	0.121	.247*	.372**	1				
9	DERV-4	0.095	-0.041	0.172	.244*	-0.025	0.052	0.116	.241*	1			
10	FP-1	-0.036	0.078	0.082	0.06	0.087	-0.045	0.029	0.143	.231*	1		
11	FP-2	0.19	-0.077	0.135*	0.204	0.199	-0.116	-0.012	0.156	.343**	0.164	1	
12	FP-3	0.048	0.035	-0.078	0.041	0.007	-0.003	-0.02	0.009	0.012	.392**	0.009	1

Table 10. Correlation Test Matric (2010)

No	Indicator Code	1	2	3	4	5	6	7	8	9	10	11	12
1		CG-1	1										
2	CG-2	-0.028	1										
3	CG-3	0.031	0.036	1									
4	CG-4	0.155	-0.051	.437**	1								
5	CG-5	-0.074	0.07	0.039	-0.084	1							
6	DERV-1	.226*	-0.093	0.006	0.088	-0.04	1						
7	DERV-2	.339**	-0.01	0.153	0.065	-0.136	0.125	1					
8	DERV-3	.364**	0.066	0.12	0.125	-0.019	.262*	.389**	1				
9	DERV-4	0.072	-0.028	.257*	.257*	-0.085	0.013	0.033	.263*	1			
10	FP-1	-0.009	0.089	0.061*	-0.028	-0.037	0.051	-0.004	0.15	0	1		
11	FP-2	0.045	-0.121	0.159	0.142	-0.081	0.015	0.015	0.135	.221*	.289**	1	
12	FP-3	0.068	0.038	-0.081	0.012	-0.023	-0.018	-0.094	0.008	-0.124	.451**	-0.101	1

Table 11. Correlation Test Matric (2009)

No	Indicator Code	1	2	3	4	5	6	7	8	9	10	11	12
1	CG-1	1											
2	CG-2	-0.088	1										
3	CG-3	0.039	.228*	1									
4	CG-4	0.189	-0.181	0.213	1								
5	CG-5	0.121	.308**	0.151	-0.001	1							
6	DERV-1	.260*	-0.084	0.085	0.051	0.039	1						
7	DERV-2	.247*	0.104	0.177	0.026	0.018	0.143	1					
8	DERV-3	0.17	0.212	.216*	0.075	0.061	0.194	.411**	1				
9	DERV-4	0.072	-0.123	.235*	.218*	-0.04	0.162	0.169	0.171	1			
10	FP-1	0.019	0.009	0.051	0.151	-0.072	-0.059	0.033	0.084	-0.092	1		
11	FP-2	-0.005	-.262*	0.017	.219*	0.007	-0.128	-0.074	-0.017	0.199	0.07	1	
12	FP-3	-0.006	-0.024	0.013	0.03	-0.03	0.089	0.018	0.105	-0.091	.409**	-0.104	1

* Level of Sig. at 10% (1.645) ** Level of Sig. at 5% (1.96) *** Level of Sig.at 1% (2.576)

Table 12. Indicator Validity Test

Construct Name	Indicator Code	2014			2013			2012			2011			2010			2009		
		Weights	t-value	Significance Level	Weights	t-value	Significance Level	Weights	t-value	Significance Level	Weights	t-value	Significance Level	Weights	t-value	Significance Level	Weights	t-value	Significance Level
Corporate Governance (CORP_GOV)	CG-1	0.612	2.428**	P<0.05	0.364	1.078	P>0.10	0.381	1.422	P>0.10	0.493	1.429	P>0.10	0.712	1.867*	P<0.10	-0.410	0.956	P>0.10
	CG-2	0.180	0.457	P>0.10	-0.111	0.284	P>0.10	-0.199	0.634	P>0.10	-0.024	0.084	P>0.10	-0.015	0.048	P>0.10	-0.804	1.657*	P<0.10
	CG-3	0.138	0.537	P>0.10	0.351	1.124	P>0.10	0.150	0.487	P>0.10	0.463	1.256	P>0.10	0.506	1.443	P>0.10	0.191	0.607	P>0.10
	CG-4	0.616	2.483**	P<0.05	0.606	2.101**	P<0.05	0.635	2.206**	P<0.05	0.430	1.646*	P<0.10	0.144	1.655*	P<0.10	0.488	1.647*	P<0.10
	CG-5	0.258	0.901	P>0.10	0.440	1.512	P>0.10	0.286	1.198	P>0.10	0.335	1.003	P>0.10	-0.282	0.874	P>0.10	0.318	1.006	P>0.10
Derivative Use (DERV)	DERV-1	0.343	1.200	P>0.10	0.591	2.046**	P<0.05	0.440	1.458	P>0.10	-0.028	0.095	P>0.10	0.192	0.620	P>0.10	-0.178	0.408	P>0.10
	DERV-2	0.035	0.114	P>0.10	-0.189	0.485	P>0.10	-0.078	0.207	P>0.10	0.080	0.246	P>0.10	0.577	1.655*	P<0.10	-0.399	1.082	P>0.10
	DERV-3	0.694	1.743*	P<0.10	0.484	1.253	P>0.10	0.238	0.648	P>0.10	0.550	1.757*	P>0.10	0.318	0.836	P>0.10	-0.206	0.473	P>0.10
	DERV-4	0.324	0.928	P>0.10	0.449	1.356	P>0.10	0.730	2.086**	P<0.05	0.687	1.359	P<0.05	0.475	1.104	P<0.05	0.957	1.658*	P<0.10
Financial Performance (FIN_PERF)	FP-1	0.834	2.278**	P<0.05	0.532	1.222	P>0.10	-0.449	0.996	P>0.10	0.385	0.817	P>0.10	0.358	0.542	P>0.10	-0.105	0.232	P>0.10
	FP-2	0.334	1.720*	P<0.10	0.804	1.834*	P<0.10	0.906	1.937*	P<0.10	1.008	1.786*	P<0.10	0.695	1.655*	P<0.10	1.008	1.659*	P<0.10
	FP-3	0.002	0.005	P>0.10	-0.192	0.368	P>0.10	0.436	1.135	P>0.10	0.047	0.817	P>0.10	-0.594	0.865	P>0.10	0.047	0.092	P>0.10

Note: Table presents the indicator validity test, author calculation.

* Level of Sig. at 10% (1.645) ** Level of Sig. at 5% (1.96) *** Level of Sig.at 1% (2.576)

Table 13. Indicator Reliability Test

Construct Name	Indicator Code	2014 VIF	2013 VIF	2012 VIF	2011 VIF	2010 VIF	2009 VIF
	CG-1	1.073	1.084	1.097	1.066	1.029	1.094
	C2G-2	1.079	1.059	1.022	1.141	1.036	1.207
Corporate Governance	CG-3	1.080	1.069	1.291	1.189	1.244	1.158
(CORP_GOV)	CG-4	1.191	1.106	1.376	1.218	1.276	1.144
	CG-5	1.073	1.038	1.047	1.155	1.031	1.170
	DERV-1	1.077	1.049	1.076	1.065	1.078	1.061
Derivative Use	DERV-2	1.235	1.269	1.255	1.162	1.186	1.222
(DERV)	DERV-3	1.345	1.402	1.395	1.279	1.351	1.242
	DERV-4	1.081	1.091	1.085	1.062	1.085	1.060
Financial Performance	FP-1	1.161	1.198	1.116	1.219	1.463	1.220
(FIN_PERF)	FP-2	1.141	1.048	1.015	1.032	1.178	1.027
	FP-3	1.021	1.221	1.101	1.186	1.355	1.227

Note: Table shows the indicator reliability test, authors calculation.

Analysis of Structural Model

As per requirement of PLS-SEM the analysis of the structural model is done.

Path Coefficient (β)

The path coefficient for H1 is significant in years 2014, 2013 2012, 2011, and 2010 (β=, 0.442, 0.332, 0.392, 0.388, 0.256) and insignificant in year 2009 (β=, 0.347; t-value= 0.786; P>0.10,). The first condition of mediation is acceptable for years 2014, 2012, 2011, and 2010, however as per criteria of Chin (1998) beta coefficient accepted for all six years 2009-2014 because its values are greater or equal to 2.0.

The path coefficient for H2 remains significant in all six years 2014, 2013, 2012, 2011, 2010 and 2009 (β=0.445, 0.456, 0.503, 0.496, 0.438, 0.408). The second condition of mediation accepted for all years 2009-2014 and beta coefficient values are greater than 0.3.

The path coefficient for H3 remains significant in years 2014, 2013, 2012, 2011, 2010 (β =0.432, 0.332, 0.317, 0.446, 0.250; and insignificant in years 2009 (β= 0.299). The third condition for mediation accepted for years 2014, 2013, 2012, 2011 and 2010 and the beta coefficient is acceptable in all six years 2014 to 2009. According to criteria of Baron and Kenny (1986) as discussed in introduction section after analyzing the first three conditions (H1 to H3) the fourth (H4) to be analyzed for those years which satisfy the first three conditions as given in Figures 1 to 25.

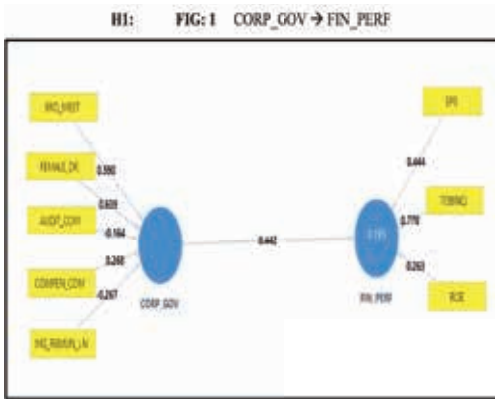
The H1, H2, H3 are accepted for 2014, 2013, 2012, 2011, 2010 and rejected for the year 2009. Now the H4 is tested for all years to check the indirect (mediating) effect of corporate governance passing through derivatives usage on financial performance. The result as given in Tables 13 to 18, shows that the relationship proposed is confirmed for four years 2014, 2013, 2011, and 2010 because VAF-values are 60%, 66%, 38%, 67% and direct relationship (β) 0.099, 0.062, 0.194, 0.041 is weaken after applying mediation (Helm et at.,2010; Baron and Kenny, 1986). However, it is rejected for two years 2012, 2009 as VAF-values are 9.2%, 15.62% and direct relationship after mediation remain strong 0.332, 0.281.

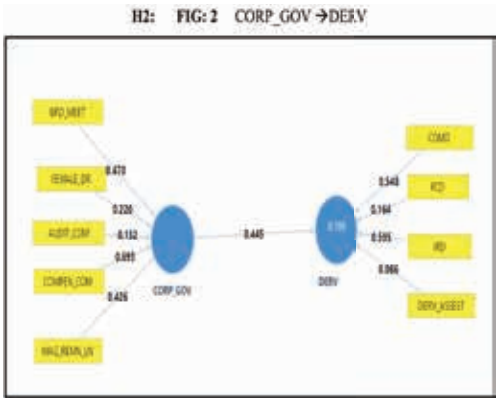
Overall Model Estimation and Predictive Relevance (R2 and Q2)

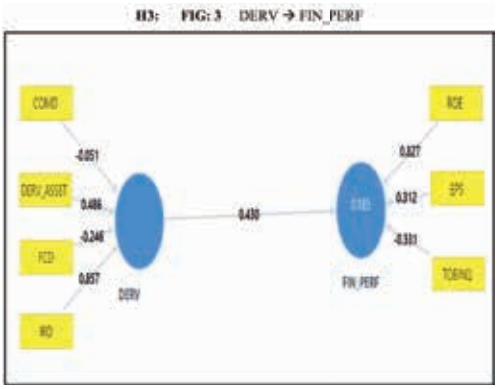
The overall model estimation done through the coefficient of the determinant (R2) which is greater than 10% is satisfactory to be reported (Bellman, 2003). The predictive relevance testing is done through Stone Gessier predictive relevance test (Q2) and cross-validation redundancy parameter is applied. As per Chin, (1998) Q2 should be greater than zero.

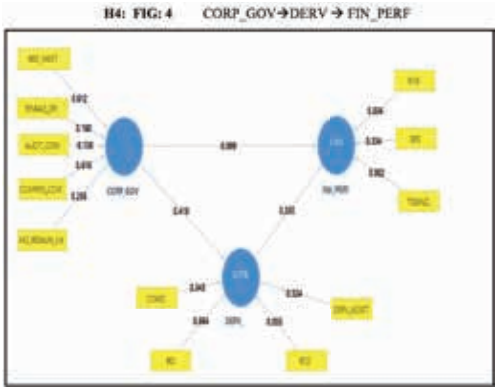
The study result shows that the model constructed well and satisfies the criteria (Fornell and Cha, 1994) as given in tables 13 to 18. The value of R2 and Q2 for H4 for the years 2014, 2013, 2011, and 2010 are acceptable, and it confirms the relationship presented in this study.

Structural Equation Model Analysis- 2014



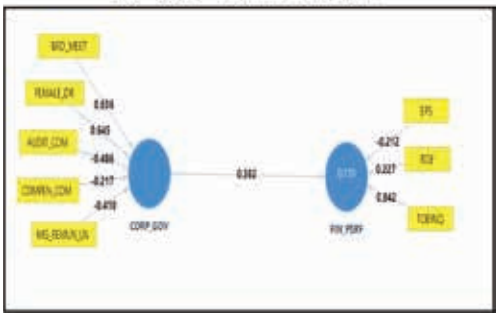




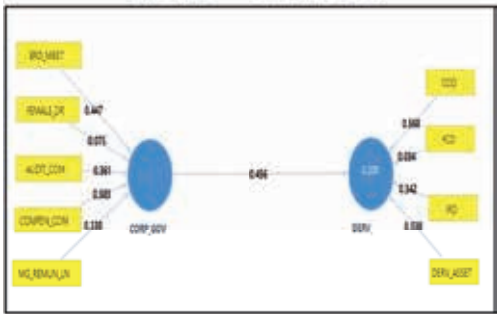


Structural Equation Model Analysis- 2013

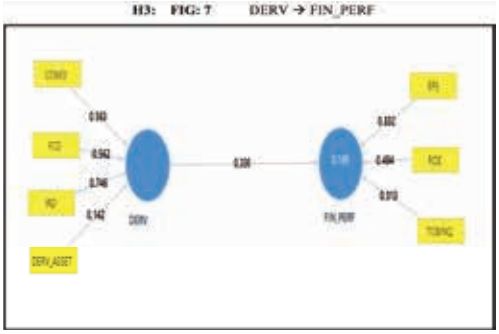
H1: FIG: 5 CORP_GOV → FIN_PERF



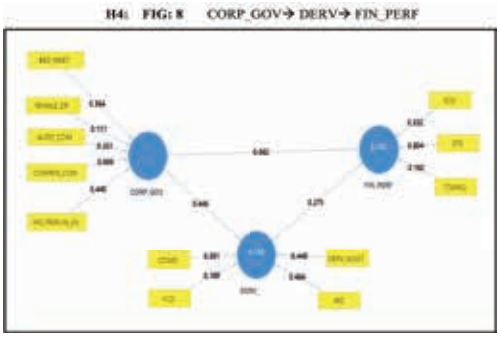
H2: FIG: 6 CORP_GOV → DERV



H3: FIG: 7 DERV → FIN_PERF

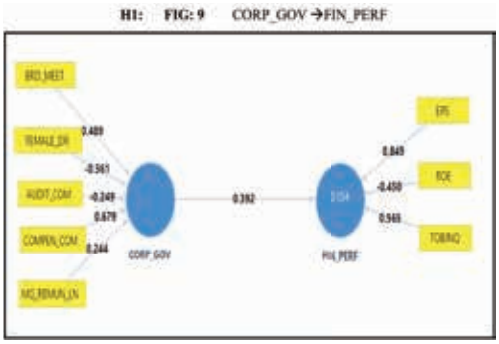


H4: FIG: 8 CORP_GOV→ DERV→ FIN_PERF

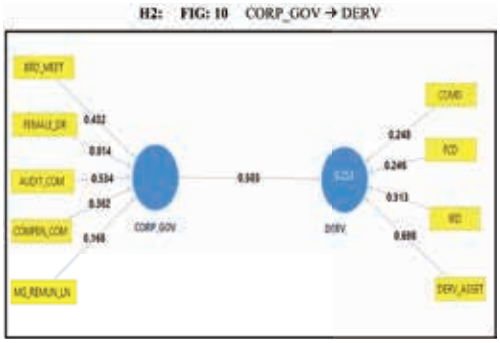


Structural Equation Model Analysis- 2012

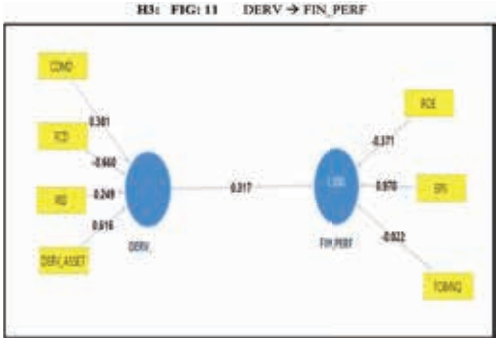
H1: FIG: 9 CORP_GOV →FIN_PERF



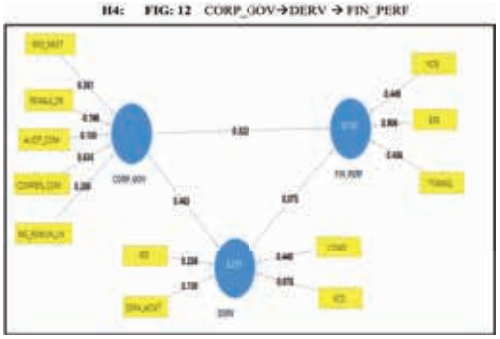
H2: FIG: 10 CORP_GOV → DERV



H3: FIG: 11 DERV → FIN_PERF

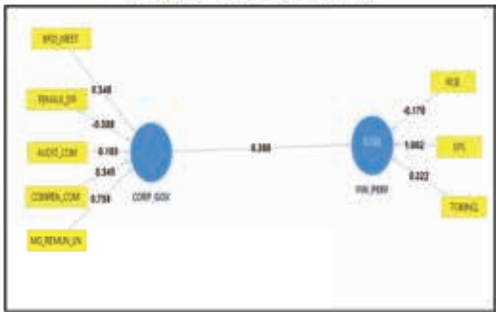


H4: FIG: 12 CORP_GOV→DERV → FIN_PERF

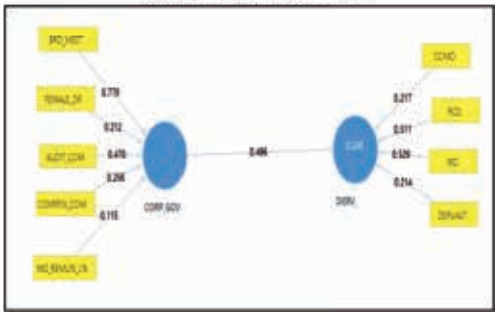


Structural Equation Model Analysis- 2011

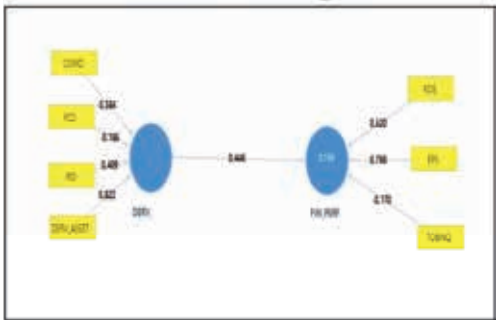
H1: FIG: 13 CORP_GOV → FIN_PERF



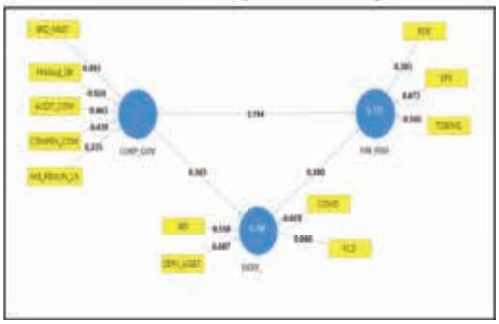
H2: FIG: 14 CORP_GOV → DERV



H3: FIG: 15 DERV → FIN_PERF

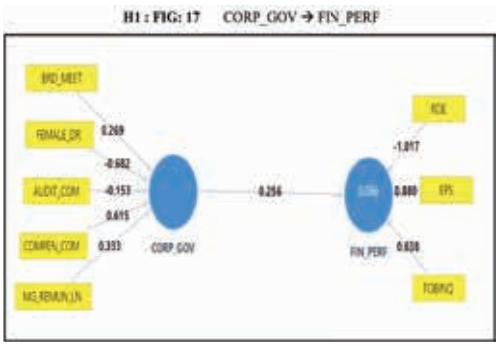


H4: FIG: 16 CORP_GOV→DERV → FIN_PERF

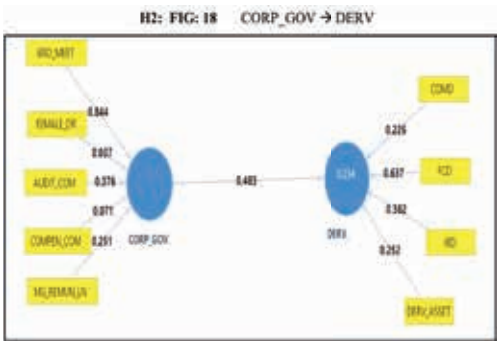


Structural Equation Model Analysis- 2010

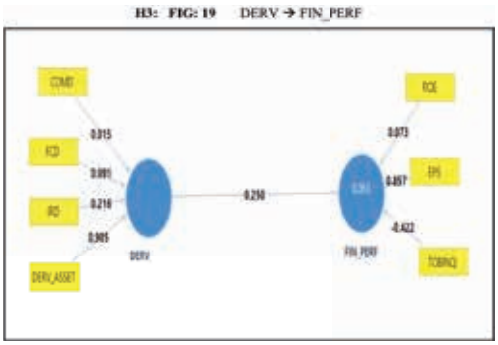
H1 : FIG: 17 CORP_GOV → FIN_PERF



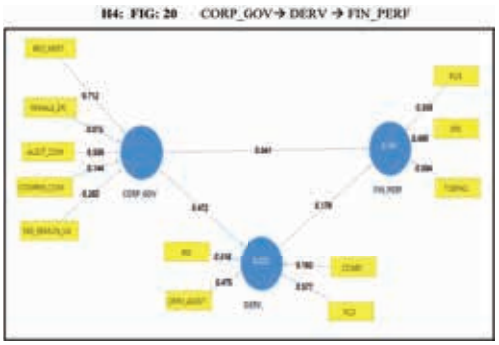
H2: FIG: 18 CORP_GOV → DERV



H3: FIG: 19 DERV → FIN_PERF



H4: FIG: 20 CORP_GOV→ DERV → FIN_PERF



Structural Equation Model Analysis- 2009

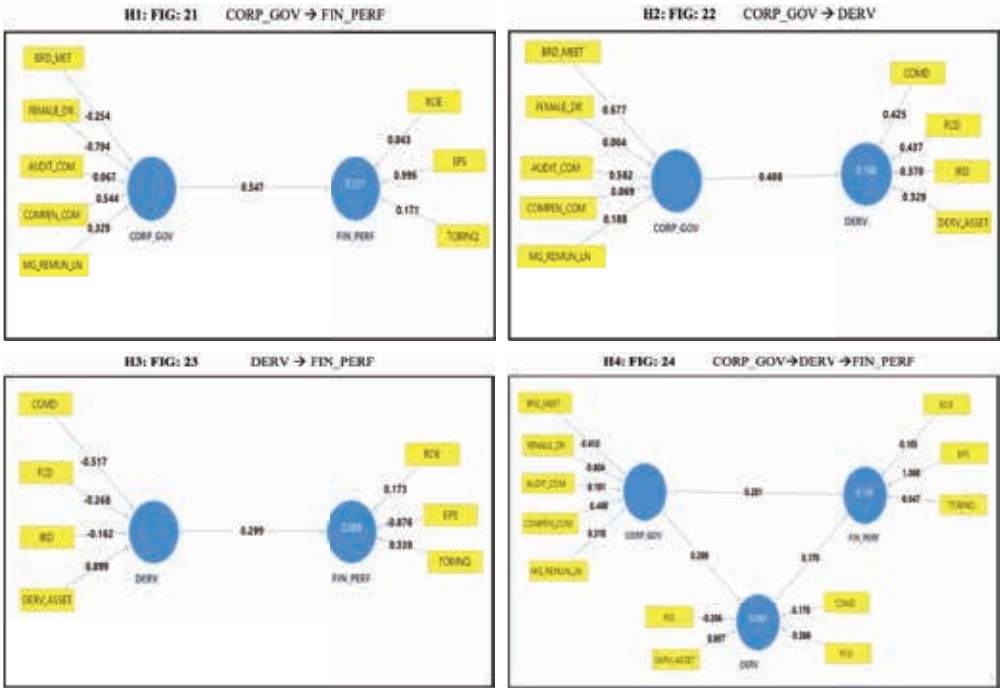


Table 14: Conditions of Mediation (H1 to H3) -2014

Hypothesis	Path	Beta Coefficient	t-value	Significance	R^2	Q^2	Criterion
H1	CORP_GOV→FIN_PERF	0.442***	3.128	P<0.01	0.195	0.049	>0.000
H2	CORP_GOV→DERV	0.445**	2.248	P<0.05	0.198	0.029	>0.000
H3	DERV→FIN_PERF	0.432**	2.059	P<0.05	0.185	0.032	>0.000

Mediation (H4)

		Beta Coefficient					R^2	Q^2	Criterion
Hypothesis	Path	Direct Effect	Indirect Effect	Total Effect	VAF	Result			
H4	CORP_GOV → DERV → FIN_PERF	0.099	0.147 0.429X0.350=	0.246	60%	Partial Mediation	0.161	0.010	>0.000

Note: Table presents the indicator validity test, author calculation.

Table 15: Conditions of Mediation (H1 to H3) -2013

Hypothesis	Path	Beta Coefficient	t-value	Significance	R^2	Q^2	Criterion
H1	CORP_GOV→FIN_PERF	0.332*	1.656	P<0.10	0.110	0.031	>0.000
H2	CORP_GOV→DERV	0.456**	2.445	P<0.05	0.208	0.026	>0.000
H3	DERV→FIN_PERF	0.330*	1.655	P<0.10	0.109	0.005	>0.000

Mediation (H4)

		Beta Coefficient					R^2	Q^2	Criterion
Hypothesis	Path	Direct Effect	Indirect Effect	Total Effect	VAF	Result			
H4	CORP_GOV → DERV → FIN_PERF	0.062	0.123 0.446X0.275=	0.185	60%	Partial Mediation	0.195	0.001	>0.000

Note. The table represents the Path Coefficient and Overall Model Analysis, author calculation.

Table 16: Conditions of Mediation (H1 to H3) -2012

Hypothesis	Path	Beta Coefficient	t-value	Significance	R^2	Q^2	Criterion
H1	CORP_GOV→FIN_PERF	0.392*	1.665	P<0.10	0.154	0.007	>O.OOO
H2	CORP_GOV→DERV	0.503**	2.805	P<0.05	0.253	0.023	>O.OOO
H3	DERV→FIN_PERF	0.317*	1.734	P<0.10	0.100	0.027	>O.OOO

Mediation (H4)

		Beta Coefficient					R^2	Q^2	Criterion
Hypothesis	Path	Direct Effect	Indirect Effect	Total Effect	VAF	Result			
H4	CORP_GOV → DERV → FIN_PERF	0.332	0.034 0.463X0.073=	0.366	9.2%	No Mediation	0.131	0.023	>0.000

Note. The table represents the Path Coefficient and Overall Model Analysis, author calculation.

* Level of Sig. at 10% (1.645) ** Level of Sig. at 5% (1.96) *** Level of Sig.at 1% (2.576)

Table 17: Conditions of Mediation (H1 to H3) -2011

Hypothesis	Path	Beta Coefficient	t-value	Significance	R^2	Q^2	Criterion
H1	CORP_GOV→FIN_PERF	0.388*	1.793	P<0.10	0.150	0.006	>0.000
H2	CORP_GOV→DERV	0.496***	4.941	P<0.01	0.246	0.022	>0.000
H3	DERV→FIN_PERF	0.446*	1.953	P<0.10	0.199	0.027	>0.000

Mediation (H4)

		Beta Coefficient					R^2	Q^2	Criterion
Hypothesis	Path	Direct Effect	Indirect Effect	Total Effect	VAF	Result			
H4	CORP_GOV → DERV → FIN_PERF	0.194	0.116 0.385X0.300=	0.310	38%	Partial Mediation	0.172	0.013	>0.000

Note. The table represents the Path Coefficient and Overall Model Analysis, author calculation.

Table 18: Conditions of Mediation (H1 to H3) -2010

Hypothesis	Path	Beta Coefficient	t-value	Significance	R^2	Q^2	Criterion
H1	CORP_GOV→FIN_PERF	0.256*	1.657	P<0.10	0.066	0.045	>0.000
H2	CORP_GOV→DERV	0.483**	2.372	P<0.05	0.234	0.054	>0.000
H3	DERV→FIN_PERF	0.250*	1.659	P<0.10	0.063	0.062	>0.000

Mediation (H4)

		Beta Coefficient					R^2	Q^2	Criterion
Hypothesis	Path	Direct Effect	Indirect Effect	Total Effect	VAF	Result			
H4	CORP_GOV → DERV → FIN_PERF	0.041	0.085 0.472X0.179=	0.126	67%	Partial Mediation	0.141	0.032	>0.000

Note. The table represents the Path Coefficient and Overall Model Analysis, author calculation.

Table 19: Conditions of Mediation (H1 to H3) -2011

Hypothesis	Path	Beta Coefficient	t-value	Significance	R^2	Q^2	Criterion
H1	CORP_GOV→FIN_PERF	0.347	0.786	P>0.10	0.121	0.018	>O.OOO
H2	CORP_GOV→DERV	0.408*	1.656	P<0.10	0.166	0.041	>O.OOO
H3	DERV→FIN_PERF	0.299	0.072	P>0.10	0.089	0.039	>O.OOO

Mediation (H4)

		Beta Coefficient					R^2	Q^2	Criterion
Hypothesis	Path	Direct Effect	Indirect Effect	Total Effect	VAF	Result			
H4	CORP_GOV → DERV → FIN_PERF	0.281	0.052 0.299X0.170=	0.333	15%	No Mediation	0.136	0.043	>O.OOO

Note. The table represents the Path Coefficient and Overall Model Analysis, author calculation.

* Level of Sig. at 10% (1.645) ** Level of Sig. at 5% (1.96) *** Level of Sig.at 1% (2.576)

Hypothesis Testing

The hypothesis H4 tested as per standard and concluded that derivatives usage work as mediator between the corporate governance and financial performance for years 2014, 2013, 2011, 2010 and rejected for years 2012, 2009.The hypothesis testing detail for all six years given in Table 20.

Table 20: Hypothesis Testing

Hypothesis	Expected effect	Path Coefficient	Significance	Confirmed	
2014					
H1	Positive	0.442***	P<0.01	Yes	
H2		0.445**	P<0.05	Yes	
H3		0.430**	P<0.05	Yes	
Mediation Testing		**Direct Effect after Mediator**	**VAF**	**Results**	**Confirmed**
H4	Mediation	0.099	60%	Partial Mediation	Yes
2013					
H1	Positive	0.332*	P<0.01	yes	
H2		0.456**	P<0.05	Yes	
H3		0.330*	P<0.10	Yes	
Mediation Testing		**Direct Effect after Mediator**	**VAF**	**Results**	**Confirmed**
H4	Mediation	0.062	67%	Partial Mediation	Yes
2012					
H1	Positive	0.392*	P<0.01	Yes	
H2		0.503**	P<0.05	Yes	
H3		0.317*	P<0.10	Yes	
Mediation Testing		**Direct Effect after Mediator**	**VAF**	**Results**	**Confirmed**
H4	Mediation	0.332	9.2 %	No Mediation	No
2011					
H1	Positive	0.388*	P<0.01	Yes	
H2		0.496***	P<0.01	Yes	
H3		0.446*	P<0.1	Yes	
Mediation Testing		**Direct Effect after Mediator**	**VAF**	**Results**	**Confirmed**
H4	Mediation	0.194	38 %	Partial Mediation	Yes
2010					
H1	Positive	0.256*	P<0.10	Yes	
H2		0.483**	P<0.05	Yes	
H3		0.250*	P<0.10	Yes	
Mediation Testing		**Direct Effect after Mediator**	**VAF**	**Results**	**Confirmed**
H4	Mediation	0.041	67 %	Partial Mediation	Yes
2009					
H1	Positive	0.347	P>0.1	No	
H2		0.408*	P<0.10	Yes	
H3		0.299	P>0.10	No	
Mediation Testing		**Direct Effect after Mediator**	**VAF**	**Results**	**Confirmed**
H4	Mediation	0.281	15.62 %	No Mediation	No

Note: Table shows the hypothesis testing, author calculation.

DISCUSSION AND CONCLUSION

In this study, it was argued that derivative usage can play a mediating role between corporate governance and financial performance, which checked and verified on non-financial corporates listed on New York Stock Exchange U.S. 100 index. The second-generation multivariable statistical, technique Partial Least Square, Structural Equation Modeling applied through Smart PLS 3.0 to check mediation.

According to the requirement of PLS-SEM, Figure A shows a graphical representation of all four conditions of mediation. The model based on three constructs exogenous variable, corporate governance (board meeting, female director, audit committee, compensation committee, and management remuneration), mediating variable, derivatives usage (mediator)

indicators; foreign currency derivatives, interest rate derivatives, commodity derivatives and derivatives to asset ratio) and financial performance (endogenous variable) indicators; return on equity, earning per share and Tobin-Q). The model analyzed for six years from 2009-2014 on a sample of 85 U.S. non-financial corporates. According to criteria of mediation by Helm et at. (2010) and Baron and Kenny (1986) all four conditions are analyzed through PLS-SEM. Hence, it concluded that;

(i) The result is consistent with findings of Ferrer and Banderlipe (2012) that overall corporate governance adds premium in financial performance (H1) in five years except for the year 2009, the reason behind no impact of corporate governance in 2009 is financial crises of 2007-2008 (Erkens et al., 2010).

(ii) The results show that corporate governance has a positive impact on derivatives usage (H2) in all six years (Adams et al., 2011; Lel, 2012) because board keep a strong eye on managers and influence them to use derivatives for the benefit of shareholders.

(iii) The results show that overall derivatives usage adds a premium to financial performance (H3) (Clark & Meftah, 2010; Allayannis and Weston, 2001) by minimizing risk in five years except for the year 2009. The reason behind this non-impact is European financial crises 2007-2008 because derivatives plays two folding role, first they boost the economy by risk hedging but during financial crises they create more chance of losses if before crises financial policy related to derivatives usage is weak (Dodd, 2000) so good corporate governance is must for proper financial policies.

(iv) Further, the concept presented about derivatives usage work as mediator between the corporate governance and financial performance (H4) verified by applying PLS-SEM for four years 2014, 2013, 2011, 2010 and no mediating role for two years 2012 and 2009. The reason behind the rejection of hypothesis in 2012 and 2009 is crises like global economic crises in Euro-Zone 2012 and financial crises 2007-2008 (Dodd, 2000). It concluded that strong corporate governance is mandatory to improve financial performance, directly but corporate governance has an additional impact on performance, indirectly (mediation) passing through the use of derivatives as a risk management tool.

Hence, it finalized that corporate governance has a positive impact on financial performance and the mediating role of derivatives usage add more in financial performance. This theory supported by Aebi et al. (2011) who find that strong corporate governance related to risk management is mandatory, as corporate governance alone has no impact on performance during financial crises 2007-2008. The findings of this study recommended to multinational corporates that good corporate governance mechanism and proper risk management system to use derivatives as a hedging tool is mandatory to increase financial performance. The study is not free from a few limitations. The concept offered in this study should be tested in future studies with larger sample size and regional practices of corporate governance in advanced and advancing countries such as Pakistan. Moreover, risk management should be accounted for before generalizing the findings.

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