

Impact of Overlapping Membership on Audit and Compensation Committee on Cost Behaviour: Evidence from Pakistan

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The objective of this study is to access asymmetric cost behaviour in Pakistan, an emerging economy. This study also accesses the possible impact of board committees' characteristics on the nature and extent of asymmetric cost behaviour. The study is based on three multiple regression models. The study brings into play panel data fixed model to study the behaviour of Cost of Goods Sold (COGS) and the influence of board committees' characteristics and other control variables on a sample of 86 listed companies of the Pakistan Stock Exchange from 2014–2018. The study affirms COGS asymmetric behavior. The findings of the study contradict the traditional cost model assumption that costs behave in a linear fashion. Moreover, firm-year observations with average number of members in committee overlapped members in remuneration and audit committee board compensation exhibit cost asymmetry. However, higher economic growth and institutional ownership exhibit lower cost stickiness. This study accesses the association among asymmetric cost behaviour and corporate governance from an emerging economy.

Keywords: Corporate Governance, Cost Asymmetry, Cost Stickiness, Cost Anti-Stickiness, Pakistan.

Introduction

Corporate governance (CG) affects cost stickiness. The definition is that "costs are sticky if the magnitude of the increase in costs associated with an increase in volume is greater than the magnitude of the decrease in costs associated with an equivalent decrease in volume" (Anderson, Banker, & Janakiraman, 2003, p. 48). However, the literature explains old and new empirical confirmation for this asymmetric cost behaviour responses with equivalent changes in activity.

Brasch (1927) was the first to discover the cost curve when activity increases is different from the cost curve when activity falls, leading to an asymmetric cost function (Guenther *et al.*, 2014). The latest study conducted on a US Firms Sample by Anderson *et al.* (2003) suggests that selling, general and administration (SG&A) costs rose 0.55% with 1% increase in activity but decreased only 0.35% with a 1% decrease in demand. They mark costs saved this way "Sticky Prices" or "Stickiness of Cost". Additionally, a study found that when demand rose (fell) by 1%, total costs increased (decreased) by 0.60% (0.38%) for banks in Argentina, 0.82% (0.48%) for banks in Brazil, and 0.94% (0.55%) for banks in Canada (Porporato & Werbin, 2012). This means with a 1% increase or decrease in demand, the proportion of costs that increase is higher than the number that decrease, and indicates that costs remain asymmetrical, as suggested by traditional cost model.

In the latest research, all costs react asymmetrically. Costs can react differently in response to an increase or decrease in activity and production because asymmetric cost behaviour is primarily the result of deliberate and opportunistic interventions by managers when demand changes. Such interventions must be minimized to bring cost behaviour nearer the optimal level of cost response. (Ibrahim 2018).

Notably, Ibrahim (2018) found a relationship between CG and Cost of Goods Sold (COGS), and Chen *et al.* (2012) found a

relationship between CG and selling, general and administration. In addition, there are several other characteristics of CG that must be investigated to determine the relationship with COGS (Ibrahim, 2018). More research is needed to assess the relationship between management incentives and cost behaviour (Ibrahim, 2018).

Thus, there are two main objectives of this study. The first is to determine if costs in developing countries are also asymmetric. The second one is to investigate whether corporate governance can influence cost behaviour.

This research contributes in several ways. First, it enhances the literature by examining possible cost-benefit solutions by building upon existing work by Chen *et al.* (2012) and Ibrahim (2018) to examine CG as a mechanism that strongly influences managers' decisions to reduce cost shortages. Second, this research is one of the first studies to examine asymmetric cost behaviour in Pakistan and its region.

The objective of this study is to examine the asymmetric COGS behaviour of Pakistani firms and identify the relationship (if any) between board committees' characteristics (NCB, ANMC, OMC, NOMC and BC) and cost behaviour (COGS). This study develops an equation including a three-way interaction term as prescribed by Anderson *et al.* (2003) and Kam & Weiss (2013). Furthermore, this study develops other equation with three-way interaction terms, with additional standalone variables as used by Dierynck *et al.* (2012) and Ibrahim *et al.* (2018).

Anderson *et al.* (2003) suggested an innovative regression model used to determine whether an increase in costs is dissimilar from a decrease in costs when the corresponding activity changes. This model is helpful to measure cost reactions to alteration in current sales. It will also help to differentiate the periods of rising and falling sales of a firms (Anderson *et al.*, 2003).

Literature Review

This review covers three major concepts. The first discusses studies on asymmetric cost behaviour. This is a widely accepted model that helps researchers examine the asymmetric behaviour of costs (Anderson *et al.*, 2003). One study in the US has shown that changes in sales cause different degrees of cost stickiness (Subramaniam & Weidenmier, 2003). Another recent study shows that selling, general and administration costs respond with symmetric behaviour and COGS looks anti-sticky after examining all listed manufacturing companies in Jordan from 2008–2012 (Abu-Serdaneh, 2014). Moreover, Banker and Byzalov (2014) found that operating costs exhibit sticky behaviour in 16 of 20 studies examined; they concluded that asymmetric cost behaviour is a global phenomenon. However, Dalla Via and Perego (2014) described cost behaviour inconsistent with previous studies; they found that total labour cost is sticky, but not for COGS, selling, general and administration costs, or operating costs. And Ibrahim (2015) found indications of stickiness of both selling, general and administration costs and COGS but anti-stickiness for operating costs. Dierynck *et al.* (2012) found that when managers reaching the zero earnings benchmark, it causes only minor increases in labour costs when activity increases, but larger decreases in labour costs when activity falls.

Second, researchers have investigated the incentives for managers to avoid losses. Kama and Weiss (2013) stated that such incentives mitigate cost stickiness. Koo *et al.* (2015) examined the association between earnings management and cost stickiness and found that managers minimize costs to manage earnings during a decline in activities. However, they found cost stickiness for firms with earnings management incentives. Chen *et al.* (2012) also indicated that institutional ownership, board independence and takeover threats could alleviate the agency problem's influence on cost stickiness.

Third, Pichetkun (2012) accepted that CG influences cost stickiness, but did not consider board characteristics. Banker *et al.* (2013) shows that employment protection laws restrict managers' ability to minimize labour costs when demand falls off, causing cost stickiness to increase. Finally, a recent study by Xue and Hong (2015) shows that earnings management shows that effective CG can help mitigate cost stickiness, and that cost stickiness is mitigated by the interaction between CG and earnings management.

Development of Hypotheses

A study in the US showed that changes in sales cause different degrees of cost stickiness (Subramaniam & Weidenmier, 2003). A study in Japan, proved that selling, general and administration cost behaviour is sticky, rising by 0.59%, but falling by 0.45% in response to a 1% change in sales. Furthermore, it also proved that economic situation also affects cost stickiness (He *et al.*, 2010). Another recent study shows that selling, general and administration costs exhibit symmetric behaviour and COGS exhibit anti-sticky behaviour after examining all listed manufacturing companies in Jordan from 2008–2012 (Abu-Serdaneh, 2014). However, it was revealed that CGS behaviour was asymmetric for Egyptian companies. Weiss (2010) also showed that CGS behaves asymmetrically. Moreover, Banker

and Byzalov (2014) found that operating costs exhibited sticky behaviour in 16 out of 20 countries; they concluded that asymmetric cost behaviour is a global phenomenon. Most researchers use the model of Anderson *et al.* (2003), in which costs behave asymmetrically.

From the above, the following hypothesis is extracted:

H1: The COGS behaviour of listed firms in Pakistan is asymmetric.

Board Committee Characteristics and Cost Behaviour

Pichetkun (2012) indicated that CG influences cost stickiness but did not consider board characteristics. Banker *et al.* (2013) showed that employment protection laws restrict managers' ability to minimize labour costs when demand falls off, causing cost stickiness to increase. Finally, a recent study shows that earnings management shows that effective CG can help mitigate cost stickiness, and that cost stickiness is mitigated by the interaction between CG and earnings management (Xue & Hong, 2016). A study that examines the relationship of board's characteristics and firm performance should also consider board committees' characteristics. Since this has the potential to alleviate certain costs connected with large and independent corporate boards.

Number of Committees in Board (NCB)

The number of committees of corporate boards varies greatly from company to company, typically ranging from one to nine (Klein, 1998; Reeb & Upadhyay, 2010). Ferris *et al.* (2003) focused on the number of committees and Bilimoria and Pinderit (1994) examined the gender diversity of directors.

The effectiveness of board monitoring increases when independent directors are the majority on monitoring committees (Faleye *et al.*, 2011). They also found that this increase was expensive because the director could not spend enough time giving advice.

Harrison (1987) argued that managers can elect a large number of board members. They can form different board committees to legitimize efforts of corporate governance. Previous research has found evidence that different board committees play an effective role in monitoring corporations (Beasley, 1996; Carcello & Neal, 2000; Anderson *et al.*, 2004; Hadani *et al.*, 2011). Research that examines the relationship between a board's characteristics and the firm's performance should also consider the board committees' characteristics. This has the potential to alleviate certain costs connected with large and independent corporate boards. Therefore, this study investigates whether companies can reduce some of these costs by forming a monitoring committee or other committees, leading to the following hypothesis:

H2: NCB has a significant relationship with COGS behaviour.

Average Number of Members on Committee (ANMC)

The size of an audit committee or other monitoring committee may influence the integrity of the accounts of the business (Anderson *et al.*, 2004, Khan & Yaseen, 2019) and change will reduce the perception of risk. If a committee is small and has a clear mandate, it is more likely to promote the accountability of directors of the corporate board and thus reduce problems with release. However, a positive relationship between corporate board size and company performance is expected if the company

has several committees. On average, three to five members are members of each of these permanent committees, which are more effective when they have more outsider members (Klein, 1998, Khan & Noman, 2019). Additionally, the presence of committees can also enhance the correlation between board independence and solid performance, leading to the following hypothesis:

H3: ANMC has significant relationship with COGS behaviour.

Overlapped Members in Committee (OMC)

A study from Habib and Bhuiyan (2018) confirmed that overlapping membership between compensation and audit committees help create environments where managers are more likely to reach or exceed profit margins. Audit committee members with expertise in accounting and financial analyses can play a crucial role in limiting opportunistic reporting behaviour (Dhaliwal *et al.*, 2010; Kent *et al.*, 2016). Consequently, the presence of a common member on both the compensation and audit committee has been recognized as beneficial for better information exchange between them.

A study of audit committee members with financial expertise confirmed that the presence of more financially skilled members on an audit committee improved income quality (Krishnan & Visvanathan, 2008; Dhaliwal *et al.*, 2010, Khan & Ali, 2017), reduced the possibility of repetitive changes (Marciukaityte & Varma, 2008; Cohen *et al.*, 2010) and increased the likelihood of eliminating internal weaknesses timely (Goh, 2009).

From the above analysis, this study postulate following hypothesis:

H4: OMC has significant relationship with COGS behaviour.

Number of Overlapping Members on Committees (NOMC)

Van der Zahn and Tower (2005) empirically examined the idea of Higgs (2003) that overlapping directors is sub-optimal. Using a sample of companies in Singapore, they examined directors with overlapping membership on audit, remuneration, and nomination committees. They found that boards with higher levels of overlap of members between committees were less attractive for earnings management—though there are some costs related to the overlap of members in board committees. As described by Laux and Laux (2009), the potential benefit of the delegating function to committees is that it can reduce the free-rider problem better than a large corporate board. If there is a fully overlapping members committee, the board structure and its benefits will fall. Furthermore, high levels of overlap in committees reduce effort and eliminate accountability, which can affect the audit committee's oversight role. The higher level of overlap between committees, therefore, is not related to the higher quality of financial statements. In addition, research shows that committee structures have a reduced benefit when committees have overlapping members and its earnings decrease (Laux & Laux, 2009).

H5: NOMC has a significant relationship with COGS behaviour.

Managerial Incentives

Kama and Weiss (2013) investigated incentives for managers to avoid losses and found that it will mitigate cost stickiness. Another study showed an association between earnings management and cost stickiness (Koo *et al.*, 2015) and found that

managers minimize costs to manage earning; however, firms with earnings management incentives exhibit cost stickiness. Chen *et al.* (2012) also showed that institutional ownership, board independence and intimidations of takeover by other firms could alleviate the agency problem's influence on cost stickiness. Thus, the following hypothesis:

H6: Managerial incentives have a significant relationship with COGS behaviour.

Theoretical Framework

This study extracts a following theoretical framework from the discussion above. Figure 1 shows the relationship between board committee structures and asymmetric cost behaviour. This research also includes the impact of managerial incentives on asymmetric cost behaviour and describes the moderation effect on the relationship between board committee structure and asymmetric cost behaviour.

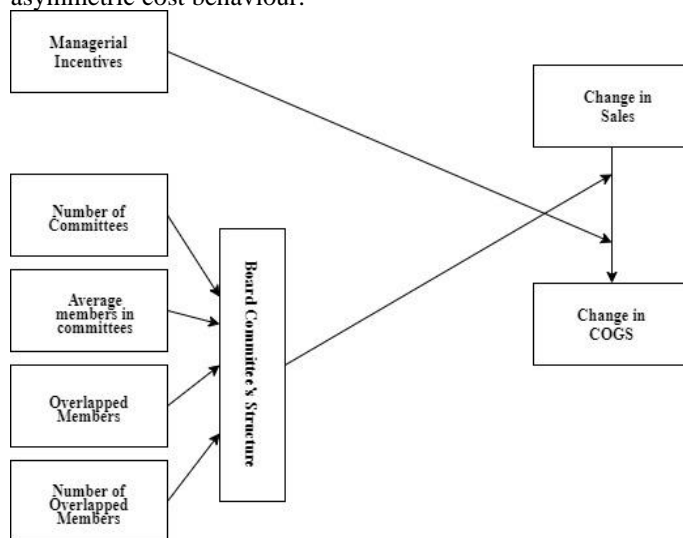


Figure 1: Conceptual/Theoretical Framework

Methodology

Sample & Data

Companies listed on the Pakistan Stock Exchange are the population of the study. This is Pakistan's only stock exchange, which has over 940 listed companies representing more than 38 industries. It is the result of a merger of three stock exchange markets (the Karachi Stock Exchange, Lahore Stock Exchange and Islamabad Stock Exchange). It is used in this study to create a non-probability sample representing all industries. This study used a number of selection criteria drawn from the previous literature. Firstly, financial sector and services sectors were excluded, due to differing capital structure and risk characteristics. Secondly, companies with inappropriate data and facing financial crisis are excluded (Tseng *et al.*, 2015). Thirdly, firms with expenses exceeding their current year's income are also excluded, and lastly, according to Cannon (2014), extreme observations, with the standardized residual value of each observation exceeds an absolute value of 3, are excluded. As a result, 86 companies comprised the sample, which represents 19.56% of the total population. Data required to measure the dependent variables; change in cost of goods sold, independent variables; Change in sales, overlapped members in committee,

number of overlapped members, number of committees in corporate governance and average members in committees board compensation were collected from the annually audited financial reports of companies and their websites for the years 2014–2018. Financial reports were downloaded from the Pakistan Stock Exchange (PSX), company websites, and head offices of companies.

Anderson *et al.* (2003) suggested an innovative regression model used to determine whether an increase in costs is dissimilar from a decrease in costs when the corresponding activity changes. This model is helpful to measure cost reactions to alteration in current sales. It will also help to differentiate the periods of rising and falling sales of a firms (Anderson *et al.*, 2003). A dummy variable (DecDummy) is used in this model to help nominate years of falling and rising activity.

Several studies (e.g. Kama & Weiss, 2013; Ibrahim, 2018) have followed the model of Anderson *et al.* (2003). To test for possible relationship between board characteristics and cost asymmetry, this study extends the model to include number of committees, average number of members per committee, overlapping members on committee (dummy variable), number of overlapping members on committee, board compensation. It also includes other control variables, such as economic growth and institutional ownership, by taking the product of each variable with DecDummyit \times Log (Δ Salesit) to create three-way interaction terms (Anderson *et al.*, 2003; Chen *et al.*, 2012; Dierynck *et al.*, 2012 and Ibrahim, 2018).

This study developed two equations: one with control variables and another without control variables.

Model 1

$$\Delta\text{COGS}_{it} = \beta_0 + \beta_1\text{Log}(\Delta\text{Sales}_{it}) + \beta_2\text{Dec_Dummy}_{it} * \text{Log}(\Delta\text{Sales}_{it}) + \Sigma$$

Model 2: (No controls)

$$\begin{aligned} \Delta\text{COGS}_{it} = & \beta_0 + \beta_1\text{Log}(\Delta\text{Sales}_{it}) + \beta_2\text{Dec_Dummy}_{it} \times \text{Log}(\Delta\text{Sales}_{it}) \\ & + \beta_3\text{Dec_Dummy}_{it} \times \text{Log}(\Delta\text{Sales}_{it}) \times \text{NCB}_{it} \\ & + \beta_4\text{Dec_Dummy}_{it} \times \text{Log}(\Delta\text{Sales}_{it}) \times \text{ANMC}_{it} \\ & + \beta_5\text{Dec_Dummy}_{it} \times \text{Log}(\Delta\text{Sales}_{it}) \times \text{OMC}_{it} \\ & + \beta_6\text{Dec_Dummy}_{it} \times \text{Log}(\Delta\text{Sales}_{it}) \times \text{NOMC}_{it} \\ & + \beta_7\text{Dec_Dummy}_{it} \times \text{Log}(\Delta\text{Sales}_{it}) \times \text{BC}_{it} \\ & + \beta_8\text{NCB}_{it} + \beta_9\text{ANMC}_{it} + \beta_{10}\text{OMC}_{it} + \beta_{11}\text{NOMC}_{it} + \beta_{12}\text{BC}_{it} + \Sigma \end{aligned}$$

Model 3: (control variables)

$$\begin{aligned} \Delta\text{COGS}_{it} = & \beta_0 + \beta_1\text{Log}(\Delta\text{Sales}_{it}) + \beta_2\text{Dec_Dummy}_{it} \times \text{Log}(\Delta\text{Sales}_{it}) \\ & + \beta_3\text{Dec_Dummy}_{it} \times \text{Log}(\Delta\text{Sales}_{it}) \times \text{NCB}_{it} \\ & + \beta_4\text{Dec_Dummy}_{it} \times \text{Log}(\Delta\text{Sales}_{it}) \times \text{ANMC}_{it} \\ & + \beta_5\text{Dec_Dummy}_{it} \times \text{Log}(\Delta\text{Sales}_{it}) \times \text{OMC}_{it} \\ & + \beta_6\text{Dec_Dummy}_{it} \times \text{Log}(\Delta\text{Sales}_{it}) \times \text{NOMC}_{it} \\ & + \beta_7\text{Dec_Dummy}_{it} \times \text{Log}(\Delta\text{Sales}_{it}) \times \text{BC}_{it} \\ & + \beta_8\text{Dec_Dummy}_{it} \times \text{Log}(\Delta\text{Sales}_{it}) \times \text{EG}_{it} \\ & + \beta_9\text{Dec_Dummy}_{it} \times \text{Log}(\Delta\text{Sales}_{it}) \times \text{IOS}_{it} \\ & + \beta_{10}\text{NCB}_{it} + \beta_{11}\text{ANMC}_{it} + \beta_{12}\text{OMC}_{it} + \beta_{13}\text{NOMC}_{it} + \beta_{14}\text{BC}_{it} + \beta_{15}\text{EG}_{it} \\ & + \beta_{16}\text{IOS}_{it} + \Sigma \end{aligned}$$

Economic growth (EG) is measured against real GDP. It is used to verify the hypothesis that when demand decreases during a period of economic growth, managers do not hesitate to withdraw resources, because they consider such a fall will be temporary. When activity falls during periods of lower economic growth, sticky cost behaviour is higher than in periods of economic growth, because managers do not withdraw allocated resources (Anderson *et al.*, 2003; Banker *et al.*, 2013; Ibrahim, 2015).

Lastly, institutional ownership (IOS) is a crucial control variable to examine the relationship between board committees' characteristics and asymmetric COGS behaviour. Institutional ownership plays an important role in better supervision. Agency theory and the effective supervisory hypothesis indicate that

institutional investors are more complex investors that have more experience and power than others and therefore, they can more effectively monitor behaviour of management (Jensen & Meckling, 1976; Abdel-Fattah, 2008). Governance mechanisms such as IOS and board independency are effective in reducing the influence of agency problems on asymmetric COGS behaviour.

Table 1: Description of Variables

Variables	Operational Definition	Measurement	Source
Dependent Variables			
ΔCOGS_{it}	Change of Cost of Goods Sold	"It is measured as the year t COGS divided by year $t-1$ for the company I"	Annual report
Independent Variables			
ΔSales_{it}	Change of Sales	"It is measured as the year t net sales divided by the net sales of year $t-1$ for the firm I"	Annual report
DecDummy _{it}	Dummy Variable	"if the current year's sales < the previous year's net sales then take dummy variable that equal to '1' and '0' otherwise"	Based on data from annual report
DecDummy _{it}	Interaction Term	"A two-way interaction term resulting from the multiplication of the dummy variable by the natural logarithm of change in net sales for the year t , for firm I"	Based on data from annual report
$\times \text{Log}(\Delta\text{Sales}_{it})$			
Board Committee Structure			
Overlapping members on committees	Dummy Variable	"A dummy variable that equal to '1' if at least one audit member is also on the compensation committee and '0' otherwise"	Based on data from annual report
Number of corporate governance committees	Number of Committees in Board	"Number of Committees in Board"	Based on data from annual report
Average number of members on committees	Average number of members in Committees	"Average number of members in Committees"	Based on data from annual report
Number of overlapping members on committees	Average number of overlapped members	Average number of overlapped members	Based on data from annual report
Board compensation	All incentives of CEO, executive & non-executive directors	"Sum of all compensation of board of directors"	Annual report
Control Variables			
Economic growth	Real GDP	"Real gross domestic product percentage growth during year t , which is used as a proxy for economic growth. It's obtained from the World Bank website."	World Bank
Institutional ownership	Ownership of institutional investor	"The total number of shares held by the institutional investor divided by the total number of company i outstanding shares in the year t "	Annual report

Data Analysis and Results

This section discusses the descriptive statistics and results of regression. To confirm that cost behaviour is sticky, β_1 should be positive and β_2 should be negative but both should be statistically significant. However, to prove that cost behaviour is anti-sticky, β_1 and β_2 both should be positive and statistically significant at the 0.01, 0.05 and 0.1 levels.

Table 1 presents descriptive statistics about annual sales and COGS for the complete five-year sample. The average COGS is 15 million Pakistani Rupees, lower than the COGS average of 945 million for Egyptian firms reported by Ibrahim (2018), and \$885.48 million for US firms reported by Subramaniam and Weidenmier (2003). The average value of COGS as a percentage of sales revenues is 76.60% (standard deviation = 13.98%) in this study's sample, greater than the average value of 63.77% reported by Subramaniam and Weidenmier (2003) and 72% by Ibrahim (2018). Average net sales in the study sample is 20 million Pakistani Rupees, with a standard deviation of 33 million Pakistani Rupees. This is a lower average value of net sales than

the average of \$5,383 million among US sample firms (Chen *et al.*, 2012). Anderson *et al.* (2003), Subramaniam & Weidenmier (2003), Calleja *et al.* (2006), and Ibrahim (2018) found greater average net sales of \$1,277, \$1,153, \$1,294 and \$2,416 million, respectively.

The mode of NCB is 2, which means that majority of the firms have two major board committees (Remuneration and Audit), as reported by Madhani (2015). The ANMC mode is 3, meaning the average committee has three members, in line with the findings of Upadhyay *et al.* (2013). There are three to seven members on committees of firms listed in the Pakistan Stock Exchange.

About 91% of the observation from sample consisted of overlapping membership in audit and remuneration committees, meaning that at least one member of the audit committee is also a member of the remuneration committee. There is an average of two overlapping members serving on both committees (audit and remuneration), while the maximum number of overlapping members is five.

The average value of Economic Growth is 5.12%, which indicates that the average economic growth remained 5.12% during the whole study period (2014–2018). Finally, the average value of institutional ownership is 6.44%.

Table 2: Descriptive Statistics

Construct	Variables	Mean	Mode	Maximum	Minimum	Std. Dev.
Asymmetric Cost Behaviour	COGS	15,928,431		224,167,482	486	27,614,309
	COGS%	76.60		130.14	8.59	13.98
	Sales	20,800,765		233,607,420	599	33,050,880
Board Committees' Characteristics	NCB		2	6	1	
	ANMC		3	7	3	
	OMC		1			
	NOMC		2	5	0	
Board Compensation	BC	385,589.2		5,883,220	0	716,107.8
Control Variables	EG	5.213		5.701	4.675	0.476
	IOS	6.438		618.834	0.137	42.178

ΔCOGS_{it}: Change in cost of goods sold, NCD: Number of Committees, ANMC: Average Number of Members on Committee, OMC: Overlapping Members on Committee, NOMC: Number of Overlapping Members on Committee, BC: Board Compensation, EG: Economic Growth, IOS: Institutional Ownership.

Table 2 provides the Pearson correlation between independent variables. These results reflect that the increase in number of committees in board and committee size are related to an increase in the chance of overlapping memberships on committees. The increase in the number of board committees and committee size is also related to an increase in board compensation.

Table 3: Correlation Analysis

Variables	ΔCOGS _{it}	ΔSG&A _{it}	ΔOCI _{it}	ΔTCI _{it}	ΔSales _{it}	NCB	ANMC	OMC	NOMC
ΔCOGS _{it}	1								
G&A _{it}	0.134	1							
ΔOCI _{it}	0.169	0.907	1						
ΔTCI _{it}	0.141	0.581	0.574	1					
ΔSales _{it}	0.581	-0.026	-0.02	0.01	1				
NCB	0.004	-0.025	-0.02	-0.08	-0.015	1			
ANMC	0.029	0.039	0.043	-0.00	-0.03	0.24	1		
OMC	-0.037	-0.002	-0.01	0.00	0.013	0.12	0.111	1	

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NOMC -0.004 -0.024 -0.03 -0.00 0.014 0.13 0.452 0.51 1

Table 3 exhibits the Pearson correlation between independent and dependent variables. These data suggest that a board committees of lower quality leads to higher asymmetric cost behaviour. In contrast, more correlations among the board committees' characteristics are greater, indicates greater quality, and results in a lower degree of asymmetric cost behaviour (and vice versa).

Table 4 shows that majority of variables are not normally distributed, supported by the results of a Jarqua–Bera test. Kurtosis and skewness values show that the variables other than Sales are normally distributed; most kurtosis values are less 3.00, and skewness values are in the range -0.8 to 0.8 (Jondeau & Rockinger, 2003).

Table 4: Normality Test

Construct	Variables	Skewness	Kurtosis	Jarque–Bera	Prob Value
Asymmetric Cost Behaviour	ΔCOGS _{it}	-0.18	3.01	2.2	0.33
	ΔSales _{it}	4.93	99.9	169989.5	0
Board Committees' Characteristics	NCB	1.43	8.47	683.92	0
	ANMC	1.25	3.82	124.52	0
	OMC	-2.95	9.72	1432.7	0
	NOMC	0.26	1.97	23.9	0
Board Compensation	BC	-1.76	11.25	1439.73	0
Control Variables	EG	-0.3	1.25	61.73	0
	IOS	0.93	6.23	248.08	0

ΔCOGS_{it}: Change in cost of goods sold, NCD: Number of Committees, ANMC: Average Number of Members on Committee, OMC: Overlapping Members on Committee, NOMC: Number of Overlapping Members on Committee, BC: Board Compensation, EG: Economic Growth, IOS: Institutional Ownership

High collinearity among independent variables can be problematic when assessing the relationship between dependent and independent variables. It can be calculated using Variance Inflation Factors (VIFs) for each independent variable. Even if the correlation between the independent variables is not high, some degree of multicollinearity may still be present (Kanagaretnam *et al.*, 2007). The critical value of VIFs should be below 10, while the values in this study fell in an acceptable range of 1.01–1.77.

The white heteroscedasticity (non-cross products) test was used. The LM statistic (Breusch–Pagan/Cook–Weisberg test for heteroscedasticity) remained below its critical value in almost all cases. It indicates that the deviation of independent variable at each level is homogeneous. Accordingly, there is no evidence of heteroscedasticity. Thus, the regression results are reliable and there is no need to find generalized/weighted least squares for further analysis.

Table 4.4 shows the estimated values of necessary statistics of the model. Hausman's test supports the panel data fixed effect model. Thus, the coefficient β₁ 1.00 attached to Sales_{it} means that if Sales is increased by one rupee, and other variables held constant, COGS_{it} will increase by one rupee: a positive relationship. The slope coefficient β₂ -0.217 attached to DeDummy_{it} × Log(ΔSales_{it}) remains negative and significant in this model, supporting cost stickiness. The combined value of β₁ and β₂ (1.00-0.22) is 0.88, which shows that COGS_{it} decreases by about 0.88 rupees for a one-rupee fall in sales. The coefficients β₁ and β₂ are significant at the 0.01 and 0.05 levels, respectively, showing that costs behave asymmetrically. Furthermore, the values of the F-Statistic and R² show that model

is statistically significant and explains 66% of the observed variation.

Table 5: Panel Least Squares of Model of Asymmetric COGS Behaviour

Variable	Coefficient	t-Statistic	Prob.	ΔCOGS_{it}
C	0.02	1.92	0.05	
Sales _{it}	1	23.94	0	
DeDummy _{it} × Log(ΔSales_{it})	-0.22	-2.25	0.02	
R ² within				0.66
F(2,342)				333.9
Prob > F				0
Hausman Test (χ^2 statistic)				2.74
Prob (Hausman Test)				0

ΔCOGS_{it} : Change in cost of goods sold, DeDummy_{it} × Log(ΔSales_{it}): Interaction Term

The results indicate asymmetric cost behaviour in developing countries. In addition, these results are in accordance with Balakrishnan *et al.* (2014) and Ibrahim (2018) who found that the COGS behaviour is asymmetric. These results suggest that managers' decisions about resource adjustments are one of the main determinants of cost behaviour (Anderson *et al.*, 2003; Baumgarten, 2012) and cost asymmetry theory when activity changes. (Banker & Byzalov, 2014).

One supporting argument for asymmetric COGS behaviour is that managers would like to purchase raw material in large quantities so that they can take advantage of bulk discounts. Horngren *et al.* (2012) explained the impact of discounts availed by purchasing large quantities of raw material on cost behaviour. It further shows that multiple slopes can appear over a small area, leading to a non-linear cost curve. Labour costs are the second component of COGS. Labour costs behave asymmetrically in an examination of learning curves and knowledge capital. The training curve idea demonstrate that workers put in more overtime in labour-intensive industries. This practice causes to increase and decrease productivity of labour costs. In terms of intellectual capital, managers try to avoid letting good and highly skilled employees leave when activity decreases, which plays a role in COGS stickiness.

Table 5 shows the estimated values of necessary statistics of the model. Hausman test supports the panel data fixed effect models. Table 6 shows that β_1 is positive and significant at 0.01 ($\beta_1 = 66.07$, t-statistic = 37.22), whereas β_2 is positive and significant at 0.01 ($\beta_2 = 96.29$, t-statistic = 4.07). The results in this table support anti-sticky cost behaviour. But after adding control variables, the cost shows sticky behaviour. The results in Table 5 confirm the empirical hypothesis of COGS asymmetric behaviour, and that COGS behaviour is asymmetric, as shown for the basic model in Table 4.

More committees in board will show higher standard of corporate governance and lesser cost stickiness. But the number of committees has an insignificant relationship with cost asymmetric behaviour, with or without control variables. While there is a positive and statistically significant relationship between number of committees and cost asymmetric behaviour after adding standalone variables, the relationship becomes insignificant after the addition of control variables. The possible reason is that, in order for committees of the board to function effectively, the structure of the board of directors represents a way of working which in itself is not easy to observe. Most committees are involved in overseeing, not formulating strategy. These committees are designed to protect the interests of

shareholders and supervise the board of directors, which may result in conflicts of interest between committees. Furthermore, when activity changes, board committees may report to managers to adjust resources, as they please, regardless of its effects on cost behaviour.

Based on the results for Average Number of Members on Committee (ANMC coefficient β_4 is positive and statistically significant at the 0.06 level, as shown in the Table 6, with and without control variables. This proves that ANMC can affect cost behaviour. As argued earlier, ANMC are considered to experience less cost stickiness. The findings support the claim that lesser number of members in a committee are likely to have a more clearly defined mandate, and thus this seems to be a good CG mechanism. It also seems highly likely that a smaller number of committee members can more easily and effectively communicate within the company, and that there is a lower possibility of conflict among them. This is in line with the argument of Jensen (1993), large boards face more trouble because members are not able to coordinate effectively, and Goodstein *et al.* (1994) proved bigger boards participate less in a company's strategic decisions. The probable justification, which emphasis that small boards effectively observe decision of adjustment of resources, because they face minimum disputes. For the OMC, the findings show that the coefficients are positive and significant at the 0.01 level in all four cases ($\beta_5 = 57.97$; (5.05); 49.30 (4.35); 55.27 (4.37); 43.99 (3.43)}. This result indicates that cost stickiness is reduced when at least one member serves on both the audit and remuneration committees. In line with this finding, Moody's Investors Service (2006, p. 8) suggested that one member from the audit committee should be on the remuneration committee, explaining that "the audit committee should have a thorough understanding of executive incentives and goals so that it is aware of management's motivations". This is particularly important given the vital role of the audit committee in overseeing the quality of financial reports, and the growing concern about the impact of compensation mechanisms on earning management. Encouraging oversight result can be achieved where members of the two committees overlap.

NOMC showed greater cost stickiness. But here, the number of overlapping members of audit and remuneration committees has an insignificant relationship with cost asymmetric behaviour regardless of the presence of control variables. While Table 6 shows a negative and statistically significant relationship with cost asymmetric behaviour after adding standalone variables, the relationship with cost behaviour becomes insignificant after the addition of control variables. This may result from the costs associated with overlapping levels. Small groups, such as committees, can reduce problems that plague larger groups (Laux & Laux, 2009). If there is complete overlap of membership among different committees, then the committee structure and roles of individual committees break down. In addition, research shows that committees' structures have the advantage of being reduced if they overlap too much (Laux & Laux, 2009). The benefits of overlapping membership decrease after a certain point, and appears to have a detrimental effect

because the costs of the overlap outweigh the benefits (Chandar *et al.*, 2012).

One can experience higher cost stickiness through a high board compensation, which contradicts this study's assumptions regarding BC. Sometimes, managers cut resources in order to achieve earning targets when sales fall in order to receive incentives. Therefore, incentives influence managers' decisions, and ultimately affect asymmetric cost behaviour. The results show that managers' decisions affect the asymmetry of firms' cost structure. Previous studies have shown that management decisions help to increase firm value and lead to cost stickiness (Anderson *et al.*, 2003; Balakrishnan, *et al.*, 2004; Balakrishnan & Gruca, 2008 and Banker *et al.*, 2011). Notably, Chen *et al.* (2012) suggest that agency-driven incentives introduce greater cost stickiness.

There is a positive and statistically significant correlation between economic growth and cost stickiness before and after standalone variables $\{\beta_8=317.77 (3.76); 279.20 (2.49)\}$. This implies that there is less cost stickiness during periods of high economic growth. Managers are optimistic during periods of economic growth because they believe that any reduction in sales is momentary; therefore they hesitate to retire slack resources, which leads to an increase in cost stickiness (Anderson *et al.*, 2003; Ibrahim, 2015). However, this argument is incompatible with the regression result and the results of Anderson *et al.* (2003), Banker *et al.* (2013), Ibrahim (2015) and Dierynck *et al.* (2012).

Finally, a positive and statistically significant correlation is displayed by the coefficient of institutional ownership at 0.01 $\{\beta_8 = 49.97 (5.34); 50.75 (5.02)\}$, which shows that there is lower cost stickiness if there is higher institutional ownership. It also correlates with the monitoring hypotheses and agency theory, which explains that institutional investors have experience with analytical skills and have more experience and control than others, which allows these investors to observe and influence the decision making of managers (Jensen & Meckling, 1976; Abdel-Fattah, 2008). Chen *et al.* (2012) found that effective governance can be used as a tool of institutional ownership that can alleviate the control of agency problems on stickiness of selling, general and administration costs.

Overall, COGS behaves in a sticky manner and only BC enhances cost stickiness, with and without the control variables. However, ANMC, OMC, economic growth, and institutional ownership reduce cost stickiness.

Table 6: Panel Least Square of Model CG & Asymmetric COGS Behaviour

Variable Statistics	No Standalone		Standalone	
	Before Controls 01	After Controls 02	Before Controls 03	After Controls 04
β^0 : Intercept	2.05*** (5.78)	2.20*** (6.48)	-7.80 (-1.12)	-3.51 (-0.39)
β_1 : Sales _{it}	66.07*** (37.22)	68.16*** (39.39)	66.54*** (38.21)	68.39*** (39.59)
β_2 : DeDummy _{it} ×Log(ΔSales _{it})	96.29*** (4.07)	-191.27*** (-2.79)	89.42*** (3.45)	-170.40*** (-1.92)
Three-Way Interaction Terms (Variables×DeDummy _{it} ×Log(ΔSales _{it}))				

β_3 : NCB×DeDummy _{it} ×Log(ΔSales _{it})	59.11 (1.44)	-30.05 (-0.72)	99.10** (2.30)	-1.21 (-0.03)
β_4 : ANMC×DeDummy _{it} ×Log(ΔSales _{it})	90.28** (1.91)	86.92** (1.92)	125.66** (2.33)	121.92** (2.33)
β_5 : OMC×DeDummy _{it} ×Log(ΔSales _{it})	57.97*** (5.05)	49.30*** (4.35)	55.27*** (4.37)	43.99*** (3.43)
β_6 : NOMC×DeDummy _{it} ×Log(ΔSales _{it})	-29.66 (-1.41)	-13.06 (-0.65)	-53.59** (-2.22)	-26.32 (-1.10)
β_7 : BC×DeDummy _{it} ×Log(ΔSales _{it})	-56.11*** (-16.57)	-41.72*** (-10.38)	-60.09*** (-17.31)	-44.89*** (-10.16)
β_8 : EG×DeDummy _{it} ×Log(ΔSales _{it})		317.77*** (3.76)		279.20*** (2.49)
β_9 : IOS×DeDummy _{it} ×Log(ΔSales _{it})		49.97*** (5.34)		50.75*** (5.02)
Standalone Variables (Variables without Interaction)				
β_{10} : NCB			-12.24 (-0.90)	-6.38 (-0.49)
β_{11} : ANMC			-9.73 (-1.25)	-9.63 (-1.27)
β_{12} : OMC			1.20 (0.63)	2.07 (1.11)
β_{13} : NOMC			5.11* (1.72)	3.91 (2.87)
β_{14} : BC			3.34*** (3.99)	2.12*** (2.51)
β_{15} : EG				0.34 (0.04)
β_{16} : IOS				-2.10 (-1.60)
F-Statistics (Sig.)	224.33 (0.00)	196.40 (0.00)	138.22 (0.00)	113.60 (0.00)
R²	0.82	0.84	0.83	0.85

Hausman Test (χ^2 statistics)

Conclusion

This study found that the behaviour of COGS is sticky. COGS increased by around 1% for each 1% increase in sales revenue, but decreased by only 0.88% per 1% decrease in revenue. These results support Hypothesis 1: the COGS behaviour of listed firms in Pakistan is asymmetric.

The COGS behaviour remained sticky after adding board committees' characteristics to the model. ANMC, OMC and BC have a significant effect on COGS behaviour before standalone or after standalone. They also significantly affect COGS behaviour after the addition of control variables. These results support H3, H4 and H6, but do not support H2 and H5.

This study expands the literature in the field through fresh evidence on costs by providing new evidence from emerging markets and examining the impact of the characteristics of boards' committees. In addition, the average number of members of committees has been found to influence managers' decisions, and therefore affect cost behaviour. OMC has also been found to reduce cost stickiness behaviour. The results of this study revealed that smaller panels decrease cost stickiness. However, board compensation increases cost stickiness, while economic growth and institutional ownership (as control variables) reduce cost stickiness.

This study extends previous research for researchers by examining sticky behaviour in a developing country, Pakistan. Its combination of management and financial accounting perspectives may encourage researchers to apply this

multidisciplinary approach in exploring various research topics. It also suggests it may be more useful for practitioners to consider fixed costs when estimating the average amount of cost changes due to a change in activity to avoid underestimating or overestimating the responsiveness of costs to increases or decreases in activity. It can help Security Exchange Commission of Pakistan as well as production management to make accurate decisions based on accurate cost analysis.

One of the most important implications is that auditors must carefully evaluate various costing and accounting techniques. CG regulators must consider how deliberate management interventions can lead to asymmetric cost behaviour, and how CG can mitigate such interventions. Such consideration may include suggesting smaller committees, with overlap of only one member, and institutional ownership as variables that can reduce under-costs. Investors and analysts should consider asymmetric cost behaviour when making sales forecasts.

One limitation of this study is the use of a relatively small sample size compared to the samples in related studies. Additionally, only five board committee characteristics were examined in this study; several other characteristics still need to be investigated. Furthermore, this study examines the possible effect of board committee characteristics with COGS, although there are several other costs, such as selling, general and administration costs, OC, and TC, that also need to be examined.

Future studies can examine the association among asymmetric cost behavior, CG and board committee structures. Further research may examine the association among CEO compensation and asymmetric cost behaviour. Finally, membership overlap between committees, where an overlapping member is the chairman of one committee can also be identified.

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