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Corporate governance reform and family firms: Evidence from an emerging economy



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ABSTRACT

We investigate the comparative effectiveness of board independence in constraining Real Earnings Management (REMs) in family and non-family firms in the context of corporate governance reform in Bangladesh. In contrast to the pre-reform period, we find that independent directors are more effective in restricting REMs in family firms compared to non-family firms, post reform. Further, we find that the relationship between family ownership and REMs varies significantly between strong and weak corporate governance firms during the post-reform period. This nuanced impact of regulation extends the literature and may be generalised to similar domains with weaker institutions and investor protection.

1. Introduction

We examine the comparative effectiveness of board independence in restraining REMs in family and non-family firms in an emerging economy, Bangladesh. Bangladesh has its legal origin in common law, but the country suffers from relatively poor enforcement of the legal codes (Rashid, 2011; Siddiqui, 2010). It provides an appropriate setting as family ownership remains a dominant form of ownership in Bangladesh with family firms making up around 64% of the economy (Muttakin et al., 2011). This context also provides us a unique opportunity since Bangladesh has changed its corporate governance regulation in 2012 to a stricter “comply” basis from its earlier “comply or explain” basis (Bangladesh Securities and Exchange Commission, 2012). One of the conditions imposed in the notification is that the minimum proportion of independent directors on the board has to be at least one-fifth (1/5) that doubled the previous requirement of a minimum one-tenth (1/10) of the board (Bangladesh Securities and Exchange Commission, 2012; Bangladesh Securities and Exchange Commission, 2006). This exogenous shock offers a unique opportunity to investigate the effectiveness of family firm boards' independence in an emerging economy during the pre-reform and post-reform periods.

Of the different features of corporate governance, board independence is one important aspect that has drawn significant attention with regard to its effectiveness in ensuring higher quality earnings (Davidson et al., 2005; Peasnell et al., 2005; Xie et al., 2003). The presence of independent non-executive directors on the board wielded a significant influence in reducing the magnitude of earnings management (Davidson et al., 2005; Peasnell et al., 2005). In addition to the board's independence, Xie et al. (2003) examine the effectiveness of other board characteristics, i.e. number of board meetings, CEO and chair duality, size of the board, etc., and find that board independence has a significant restraining impact on firms' earnings management.

The aforementioned studies regarding the effectiveness of board independence are based on the traditional agency conflict between owner and manager. These findings may not be applicable to family firms' context where the primary agency conflict is

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between the controlling and minority shareholders. Moreover, family firms may adopt different internal governance mechanisms compared to non-family firms (Bartholomeusz and Tanewski, 2006). Family firms' boards are less represented by independent directors than non-family firms (Bartholomeusz and Tanewski, 2006). In family firms, family representations on the board may exert an influence over other board members (Anderson and Reeb, 2003). Family owners also influence the selection of board members (Johannisson and Huse, 2000) and hence, the independent directors may actually be picked by the controlling family. These independent directors may not offer effective monitoring roles in case of inappropriate actions are taken by the family owners. Accordingly, the effectiveness of board independence is expected to be less in mitigating earnings management in family firms compared to that of non-family firms.

Jaggi et al. (2009) and Prencipe and Bar-Yosef (2011) provide empirical evidence of such mitigated monitoring capacity of family firms' non-executive independent directors. However, these studies' conclusions are based on the accruals earnings management. There is no evidence whether such differentiation of family and non-family firms' independent directors exists with regard to lowering real earnings management (REMs). Moreover, the issue of REMs in family firm is thought-provoking to examine. REMs offer greater latitude in terms of timing of execution and lower detection risk and family firms may be more conducive for REMs since family owners play active managerial role (Anderson and Reeb, 2003). Moreover, Graham et al. (2005) assert that when managing earnings, managers prefer REMs to accruals. On the other hand, the likely adverse impact of REMs may deter family owners from engaging in REMs (Stein, 1989). We examine the comparative effectiveness of board independence in restraining REMs in family and non-family firms in the two periods that have different corporate governance enforcement.

Extant literature on family firms has evidence that family ownership has non-monotonic relationship with firms' performance (Anderson and Reeb, 2003). A similar approach to non-linearity is later employed in the earnings management study by Wang (2006). It is documented in Wang (2006) study that there remains a curvilinear relationship between family ownership and the earnings quality as measured by abnormal accruals. Razzaque et al. (2016) find the evidence of curvilinear relationship between family ownership and REMs in Bangladesh. Their evidence shows that the magnitude of REMs increases with the increase in the family ownership up to certain threshold. Beyond that ownership threshold the level of REMs tends to decrease with the increment in the family ownership. However, it remains to be examined what role corporate governance may play in such relationship. Accordingly, we also examine the role of corporate governance in such curvilinear relationship in two different periods with different governance enforcement.

Our results show that the effectiveness of independent directors in family firms in restricting REMs significantly improved following the corporate governance reform compared to that of non-family firms. The results are robust to further analysis including alternative approaches to address concerns about endogeneity. Similarly, a firm's governance mechanism has significant impact on the curvilinear relationship between family ownership and REM during the post-reform period. However, we do not observe any such impact in the pre-reform period. Overall, the evidence shows that the corporate governance reform in 2012 had a significant positive impact on family firms regarding REMs.

Our study contributes to the literature in several ways. First, there is a lack of empirical evidence on the effectiveness of board independence in mitigating REMs in family firms and we explore and provide evidence on the introduction of corporate governance reform in an emerging economy and the effectiveness in family vis-à-vis non-family firms in a pre and post-reform period. Second, we investigate and provide evidence on the impact of corporate governance on the curvilinear relationship between family ownership and REMs. The outcomes of our study likely add value to the literature in respect of family firms in an emerging economy and may be generalised in contexts similar to Bangladesh in terms of institutional weaknesses and inadequate investor protection.

The remainder of the paper is structured as follows. Section 2 develops the hypotheses, while Section 3 presents the research methodology. Section 4 discusses the results and Section 5 concludes the paper.

2. Hypotheses development

2.1. Independent directors and REMs in family firms

Internal corporate governance mechanisms are found to be negatively associated with firms' earnings management (Davidson et al., 2005; Klein, 2002; Peasnell et al., 2005; Xie et al., 2003). Klein (2002) examines the impact of changes in board independence on abnormal accruals in the United States. Her findings suggest that the board's independence has a significant negative effect on a firm's earnings management. Peasnell et al. (2005) provide evidence in the UK that the presence of independent non-executive directors on the board is associated negatively with firms' income increasing accruals. Independent directors are considered to provide effective oversight of opportunistic behaviour by managers. Davidson et al. (2005) made a similar conclusion for Australia.

However, these empirical findings may not be generalisable to the family firm context. Bartholomeusz and Tanewski (2006) find that family firms adopt different internal corporate governance mechanisms compared to non-family firms. They argue that in family firms, independent directors are not as effective as it is in non-family firms. At the same time, the proportion of independent directors is smaller in family firms compared to non-family firms. Interestingly, in family firms the number of "gray" or affiliated directors increases when the number of independent outside directors falls (Bartholomeusz and Tanewski, 2006). This substitution suggests that the boards of family firms are less independent compared to non-family firms. Additionally, board members in family firms are largely influenced by the family's presence hence are less independent (Anderson and Reeb, 2003). Moreover, the selection of independent directors may be dictated by family owners (Johannisson and Huse, 2000). Hence, the independent directors' role as effective governance stewards becomes more ambiguous in family firms.

Jaggi et al. (2009) document that monitoring effectiveness of independent directors is reduced in Hong Kong family firms.

Prencipe and Bar-Yosef (2011) examine the effectiveness of independent directorship and the separation of CEO and chairman in family firms compared to non-family firms in Italy. Their findings also suggest that independent directors are less effective in restricting earnings management in family firms. This was likely to have been exacerbated when the minimum requirement for board independence was 10% with a “comply or explain” approach to enforcement. In line with this argument, we argue that independent directors in family firms may not mitigate firms' REMs as may be the case in non-family firm especially in the relatively lax pre-reform corporate governance environment.

Strengthening the corporate governance may reduce the magnitude of earnings management (Lobo and Zhou, 2006). Moreover, corporate governance reform with stricter enforcement is likely to have greater impact on firms that previously exploited a lax governance environment (Hossain et al., 2011). Since this reform would require certain minimum corporate governance requirements being maintained uniformly across all firms, the opportunity for any exploitation is expected to diminish in the post-reform period.

Existing evidence from Bangladesh documents a higher prevalence of REMs in family firms in the pre-reform period (Razzaque et al., 2016). This is, perhaps, a demonstration of the weaker governance structure in family firms during pre-reform period. We argue that the more stringent requirements introduced in the corporate governance reform in 2012 are likely to have a more profound impact on the firms with weaker governance. In particular directors' independence and monitoring effectiveness in family firms are likely to improve more than other firms. Accordingly, the following hypothesis is formulated:

H1. Independent directors are more effective in restricting REMs in family firms than in non-family firms following the corporate governance reform in Bangladesh.

2.2. Corporate governance and curvilinear relationship between REMs and family ownership

An effective corporate governance mechanism can ensure the optimum return on investments (Shleifer and Vishny, 1997). Empirical evidence suggests that different corporate governance features may deter opportunistic managerial actions that result in earnings management. Most of the studies carried out in this area investigate the effectiveness of board structure and audit committee in mitigating earnings management. Independence of boards and audit committee have been shown to be negatively associated with earnings management in the US (Klein, 2002; Xie et al., 2003). In addition to investigating board independence, Xie et al. (2003) further analyse the outside directors' expertise and its restraining effect on firms' earnings management. The effectiveness of the governance mechanism has been found to be negatively associated with opportunistic earnings management elsewhere, i.e. the UK and Australia (Davidson et al., 2005; Peasnell et al., 2005).

There is very limited evidence concerning the effectiveness of corporate governance on REMs. One study in South Korea provides empirical evidence that different corporate governance features are negatively associated with REMs (Kang and Kim, 2012). These findings suggest that effective governance mechanism can play a restraining role for both types of earnings management. Wang (2006) shows the existence of a non-linear relationship between family ownership and accrual earnings management in the US context. Later, Razzaque et al. (2016) find the relationship between family ownership and REMs is non-linear, more specifically, curvilinear in a Bangladeshi context. Their result shows a positive association between family ownership and REMs at earlier stage of ownership. However, beyond a certain ownership threshold, this relationship reverses. The authors argue that the pattern of this non-monotonic or curvilinear relationship is based on the relative impacts of the entrenchment and the alignment of interest effects at different levels of ownership concentration.

We posit that during the pre-reform period, the relatively weaker external corporate governance regime may not restrict the controlling family owners' opportunism and the entrenchment effect may have more influence over a longer ownership horizon. Moreover, many firm specific governance features may be less effective due to the overall lax enforcement during this period. Therefore, we argue that governance will likely to have no significant impact on the family ownership and REMs curvilinear relationship during the pre-reform period.

The move to a stricter “comply” basis from the earlier “comply or explain” approach in the post-reform period, indicates stricter enforcement of compliance with the governance code. A relatively stronger corporate governance enforcement regime may create an environment where the alignment effect is likely to be more prominent. This is likely to influence the curvilinear relationship between family ownership and REMs. Hence, the curvilinear relationship between REMs and family ownership is expected to vary significantly from strong to weak corporate governance firms. Accordingly, the following related hypotheses are developed:

H2a. The relationship between family ownership and REMs is not a function of the strength of the firm's corporate governance during the pre-reform period.

H2b. The relationship between family ownership and REMs is a function of the strength of the firm's corporate governance during the post-reform period.

3. Methodology

3.1. Sample description

Our study considers non-financial companies listed on Dhaka Stock Exchange (DSE) for the periods from 2006 to 2016. In line with the previous studies on real earnings management (Cohen et al., 2008; Cohen and Zarowin, 2010; Roychowdhury, 2006), we

Table 1
Family and non-family firm-year by industry classification.

Industry	Family firm-year	% of Family firm-year	Non-family firm-year	% of Non-family firm-year	Total
Engineering	129	60.56%	84	39.44%	213
Food & Allied	83	51.88%	77	48.12%	160
Textile	202	85.96%	33	14.04%	235
Fuel & Power	34	24.46%	105	75.56%	139
Pharmaceuticals & Chemicals	155	84.24%	29	15.76%	184
Cement & Ceramics	73	66.36%	37	33.64%	110
IT & Services	40	46.51%	46	53.49%	86
Miscellaneous	66	50.00%	66	50.00%	132
Tannery	33	58.93%	23	41.07%	56
Total	815	62.02%	499	37.98%	1314

only consider the non-financial companies listed on DSE as the study sample. We use the local industry grouping in estimating various REMs measures in this study. Table 1 describes the number of family and non-family observations according to each industry grouping.

Our data is hand collected from several source documents. The company annual reports serve as the primary source documents. These company annual reports provide the necessary financial as well as corporate governance data. The current Bangladesh Securities and Exchange Commission (BSEC) guidelines require listed companies to disclose ownership data of board members and an annexure disclosing the compliance status of the Corporate Governance of code. We further consult alternative sources including initial public offerings (IPO) documents, rights share issue (subsequent equity offering) documents, DSE status of shareholdings of directors of listed companies and different websites.

Table 1 tabulates the family and non-family firm years in the sample according to their industry classifications. A firm year is considered to be a family firm year if one or more directors on the board are from the same family and the aggregate ownership of these directors is at least 10% of total paid-up capital. Our total sample size is 1314 firm-years, of which 62.02% belongs to family firms.

3.2. Descriptions of variables

The multivariate models this study employs to test the developed hypotheses include the dependent variables, independent variables, and control variables. The following sections explore how these variables are parameterised in the current study.

3.2.1. Dependent variables measures

REMs may be manifested through altering different regular operational activities. As argued by Roychowdhury (2006) and followed by later REMs studies (Cohen et al., 2008; Cohen and Zarowin, 2010; Gunny, 2010; Zang, 2012), these activity alterations frequently occur through manipulating sales, by overproducing to reduce the costs of goods, and by reducing discretionary expenses.

3.2.1.1. Sales manipulations. Sales manipulations take place through offering greater price discount and more lenient credit terms. The primary objective of this manipulation is to record additional sales in the current period. However, these hyped sales may disappear in the future once the firm reverts to its regular practices. Due to higher price discounts and lenient credit terms, cash flows from operations (CFO) will decrease in the current period for a given level of sales and CFO reported abnormally lower than the normal level is deemed to be a manifestation of REMs (Roychowdhury, 2006).

3.2.1.2. Overproduction. Committing to overproduction may enable a firm to report higher earnings in the current period. Producing the additional units results in spreading fixed manufacturing overheads across higher number of units and hence, reduces the per unit production costs. As long as this reduction is not outweighed by incremental marginal production costs and additional inventory holding cost, firms enjoy reporting a higher margin. However, this overproduction relative to sales results in smaller cash flow from operations due to the additional production and holding costs that are not recovered in the current period's sales. According to Roychowdhury (2006), the production costs (PROD) reported abnormally higher than the normal expected level is considered as REMs.

3.2.1.3. Decrease in discretionary expenses. Firms enjoy greater latitude in incurring expenses such as research and development (R&D) expenses, selling and administrative (SG&A) expenses, advertising expenses, employee training and maintenance. These expenses are charged in the current period and by not incurring them currently, a firm may report higher profits. This intentional reduction in discretionary expenses (DISC) also results in higher cash flows if they were to be paid in cash in the same period (Roychowdhury, 2006). The abnormally lower than normal expected level of discretionary expenses is deemed to be REMs (Roychowdhury, 2006).

Following Roychowdhury (2006) and Cohen et al. (2008), abnormal cash flow from operations (AB_CFO), abnormal production costs (AB_PROD), and abnormal discretionary expenses (AB_DISC) are used as REMs proxies. At the same time two aggregate metrics of these three individual proxies, REM_1 and REM_2, are separately employed to test whether firms employ more than one REMs

technique at a time (Cohen and Zarowin, 2010). The normal levels of cash flows from operations, production costs and discretionary expenses are estimated following Roychowdhury (2006). The difference between the actual amount and estimated normal level is considered as the abnormal level of concerned REMs proxy.

The normal level of CFO is considered to be a linear function of sales and changes in sales (Cohen et al., 2008; Roychowdhury, 2006). Accordingly, the following cross-sectional regression is employed for each industry and each year:

$$\frac{\text{CFO}_{it}}{\text{A}_{it-1}} = \alpha_1 \left(\frac{1}{\text{A}_{it-1}} \right) + \alpha_2 \left(\frac{\text{SALES}_{it}}{\text{A}_{it-1}} \right) + \alpha_3 \left(\frac{\Delta \text{SALES}_{it}}{\text{A}_{it-1}} \right) + \varepsilon_{it} \quad (1)$$

where: CFO_t = cash flow operation during period t; A_t = total assets at the end of period t; SALES_t = total sales during period t; and ΔSALES_t = change in sales computes as $\text{SALES}_t - \text{SALES}_{t-1}$.

The estimated coefficients from Eq. (1) are used to compute the normal level of CFO while the abnormal CFO is determined as the difference between actual CFO and the computed normal level of CFO, i.e. $\text{AB_CFO} = \text{Actual CFO} - \text{Normal CFO}$.

The normal level of PROD depends on the normal level of costs of goods sold (COGS) and the normal level of changes in inventory (INV) (Cohen et al., 2008; Roychowdhury, 2006). For the normal level of COGS, the following cross-sectional regression is used for each industry and year:

$$\frac{\text{COGS}_{it}}{\text{A}_{it-1}} = \alpha_0 + \alpha_1 \left(\frac{1}{\text{A}_{it-1}} \right) + \alpha_2 \left(\frac{\text{SALES}_{it}}{\text{A}_{it-1}} \right) + \varepsilon_{it} \quad (2)$$

where: COGS_t = costs of goods sold during period t. All other variables as previously defined.

The normal level of changes in INV is estimated using the following model:

$$\frac{\Delta \text{INV}_{it}}{\text{A}_{it-1}} = \alpha_0 + \alpha_1 \left(\frac{1}{\text{A}_{it-1}} \right) + \alpha_2 \left(\frac{\Delta \text{SALES}_{it}}{\text{A}_{it-1}} \right) + \alpha_3 \left(\frac{\Delta \text{SALES}_{it-1}}{\text{A}_{it-1}} \right) + \varepsilon_{it} \quad (3)$$

where: ΔINV_t = the change in inventory during the period t. All other variables as previously defined.

From Eqs. (2) and (3), the normal level of PROD is estimated with the following regression:

$$\frac{\text{PROD}_{it}}{\text{A}_{it-1}} = \alpha_0 + \alpha_1 \left(\frac{1}{\text{A}_{it-1}} \right) + \alpha_2 \left(\frac{\text{SALES}_{it}}{\text{A}_{it-1}} \right) + \alpha_3 \left(\frac{\Delta \text{SALES}_{it}}{\text{A}_{it-1}} \right) + \alpha_4 \left(\frac{\Delta \text{SALES}_{it-1}}{\text{A}_{it-1}} \right) + \varepsilon_{it} \quad (4)$$

where: PROD_t = production costs during period t computed as $(\text{COGS}_t + \Delta \text{INV}_t)$; and all other variables as previously defined.

Similar to the computation of the abnormal CFO (AB_CFO), the abnormal production cost (AB_PROD) is the difference between actual production costs and normal production costs computed with the estimated coefficients from Eq. (4), i.e. $\text{AB_PROD} = \text{Actual PROD} - \text{Normal PROD}$.

According to Roychowdhury (2006) and Cohen et al. (2008), discretionary expenses (DISC) are expressed as a function of lagged sales and the following model is employed to estimate the normal level of DISC:

$$\frac{\text{DISC}_{it}}{\text{A}_{it-1}} = \alpha_0 + \alpha_1 \left(\frac{1}{\text{A}_{it-1}} \right) + \alpha_2 \left(\frac{\text{SALES}_{it-1}}{\text{A}_{it-1}} \right) + \varepsilon_{it} \quad (5)$$

where: DISC_t = discretionary expenses for the period t; and all other variables as previously defined.

The discretionary expenses (DISC) are the aggregate of advertising, research and development, and selling and administrative expenses. The abnormal discretionary expenses (AB_DISC) are determined by subtracting normal discretionary expenses from actual discretionary expenses, i.e. $\text{AB_DISC} = \text{Actual DISC} - \text{Normal DISC}$. The normal level of discretionary expenses is estimated from the coefficients of Eq. (5).

We employ two composite metrics of REMs, REM_1 and REM_2, following Cohen and Zarowin (2010) and Zang (2012). REM_1 is the aggregate of AB_CFO and AB_DISC, whereas REM_2 is the aggregate of AB_PROD and AB_DISC. Since lower AB_DISC and higher AB_PROD refer to likelihood of REMs, we multiply AB_DISC by (-1) to achieve a consistent direction of the REM_2. This implies that a higher value of REM_2 indicates higher likelihood of REMs will occur through overproducing and reducing of discretionary expenses contemporaneously.

3.2.2. Test variables

3.2.2.1. Family ownership. We define a firm as a family firm (FAM) if one or more directors on the board are from same family and their aggregate ownership of is at least 10% of total outstanding shares. Literature has evidence of varying thresholds being used to classify family firms (Claessens et al., 2000; La Porta et al., 1999). Consistent with Anderson and Reeb (2003), we employ a dummy variable FAM and code the variable with the value one if a firm is classified as family firm, zero otherwise. However, for the test of the role of corporate governance on the curvilinear relationship between family ownership and different REMs, the percentage of common stock held by a family (FAM_OWN) is used. We collect the family ownership data from companies' annual reports, primary issue documents, subsequent equity offering documents, and relevant company websites.

3.2.2.2. Board independence. Board independence (IND_DIR) is expressed as a ratio of total number of non-executive independent directors to total number of directors on the board.

3.2.2.3. *Reform.* We code the variable REFORM with value one if the observation is from the period 2012 to 2016, zero otherwise.

3.2.2.4. *Composite governance score.* The relationship between family ownerships and REMs with reference to strong and weak governance firms is examined in this study. A dummy variable, GOV_DUM, is developed for this purpose. Any firm with a composite governance score (GOV_SCORE) more than or equal to the respective industry median is assigned with the value of one, zero if otherwise. Hence, it is expected that firms with a GOV_SCORE lower than the industry median have weak internal governance mechanisms compared to other firms in the industry. The composite governance score is an additive score developed with the following variables: the proportion of board independence in the current period, the natural logarithm of the number of board meetings attended by independent directors during the current period, assigned with value 1 if independent directors have financial expertise, zero otherwise, assigned with value 1 if audited by Big 4 auditor, zero otherwise, and coded with value 1 if independent director as audit committee chairman, zero otherwise. This GOV_SCORE is developed by summing the individual governance score and consequently, a higher score refers to a better internal governance mechanism.

3.2.3. Control variables

We control the following variables in our empirical models consistent with the extant literature on earnings management and corporate governance. Firm size (SIZE) is measured as the natural logarithm of total assets in the current period, the firm performance measured by the return on assets (ROA), leverage (LEV) as a ratio of total debts to total assets for the current period, growth (GROWTH) is proxied by the sales growth rate, F_AGE is computed as the natural logarithm of total years since a firm is incorporated, and loss (LOSS) is developed as a dummy variable and coded with the value of one if the firm recorded a loss in the previous period, zero if otherwise.

We include following corporate governance variables as control variables in the investigation of the effectiveness of independence of the board. Audit engagement is proxied by the audit fee (AUD_FEE), size of the board (B_SIZE) is measured as the natural logarithm of number of board members during the current period, and the number of board meetings (B_MEET) captures the board's activity.

3.3. Empirical models

We examine whether the impact of corporate governance differs from family to non-family firms in restraining the real activities manipulation. The other objective of our study is to investigate the impact of overall internal governance on previously observed curvilinear relationships between family ownership and REMs. Separate models are employed to conduct these empirical investigations and they are discussed in more detail below.

3.3.1. Empirical model for H1

Model 1 is developed to test the hypothesis for the effectiveness of family firms' independent directors from pre to post-reform period in restraining REMs compared to that of non-family firms. Following Jaggi et al. (2009) and Prencipe and Bar-Yosef (2011), an interaction term between the family dummy (FAM) and the proportion of independent directors on the board (IND_DIR) is employed to capture the difference between family and non-family firms concerning the effects of board independence on firms' REMs magnitude, and this interaction term is further interacted with the Reform dummy to capture the differential impact from pre to post-reform period.

Model 1:

$$\begin{aligned} \text{REM}_{it} = & \beta_0 + \beta_1 \text{REFORM}_{it} + \beta_2 \text{FAM}_{it} + \beta_3 \text{IND_DIR}_{it} + \beta_4 \text{REFORM}_{it} * \text{FAM}_{it} + \beta_5 \text{REFORM}_{it} * \text{IND_DIR}_{it} + \beta_6 \text{FAM}_{it} \\ & * \text{IND_DIR}_{it} + \beta_7 \text{REFORM}_{it} * \text{FAM}_{it} * \text{IND_DIR}_{it} + \beta_8 \text{SIZE}_{it} + \beta_9 \text{ROA}_{it} + \beta_{10} \text{LEV}_{it} + \beta_{11} \text{GROWTH}_{it} + \beta_{12} \\ & \text{LOSS}_{it} + \beta_{13} \text{F_AGE}_{it} + \beta_{14} \text{AUD_FEE}_{it} + \beta_{15} \text{B_SIZE}_{it} + \beta_{16} \text{B_MEET}_{it} + \mathcal{E}_{it} \end{aligned}$$

where: REM = real earnings management measured by the AB_CFO, AB_DISC, REM_1, AB_PROD, and REM_2; REFORM = dummy variable that takes the value of one if the observation is from post-reform period, zero if otherwise; FAM = dummy variable that takes the value of one if a firm is classified as family firm, zero if otherwise; IND_DIR = the proportion of independent directors on the board; SIZE = natural log of total assets; ROA = ratio of net income before extraordinary items to total assets; LEV = ratio of total debts to total assets; GROWTH = sales growth rate for the current period; F_AGE = natural logarithm of number of years since the firm is incorporated; and LOSS = dummy variable coded with a value of one if the firm incurs a loss in the previous year, zero if otherwise; AUD_FEE = natural logarithm of the audit fee for the current period; B_SIZE = natural logarithm of number of board members; B_MEET = natural logarithm of number of board meeting.

A significant β_7 , the coefficient of the interaction term REFORM*FAM*IND_DIR, with an expected sign supports the hypothesis that the effectiveness of board independence in family firms is significantly higher than that of non-family firms with respect to mitigating the REMs problem following the corporate governance reform.

Our study employs five different REMs proxies. The lower the level of AB_CFO, AB_DISC, and REM_1, the higher the likelihood for REMs. Hence, a positive β_7 is expected to corroborate our conjecture that the board independence in family firms are more effective in the post-reform period than the non-family firms in Bangladesh. In contrast to this, the higher values for AB_PROD and REM_2 are indicative of greater likelihood of REMs. Hence, the β_7 is expected to be negative to demonstrate the higher effectiveness of board independence in lowering REMs in family firms.

3.3.2. Empirical model for H2a and H2b

Model 2 is developed to test the impact of internal governance mechanisms on the curvilinear relationship between family ownership and the magnitude of different REMs during pre and post-reform period. A dummy variable, GOV_DUM, is developed based on a composite governance score (GOV_SCORE) of individual firms and coded with a value of one if the composite governance score is equal or more than the respective industry median value, zero if otherwise. Hence, it is expected that firms with a governance score lower than the industry median have weak internal governance mechanisms compared to the other firms in the industry.

Model 2:

$$\begin{aligned} \text{REM}_{it} = & \beta_0 + \beta_1 \text{FAM_OWN}_{it} + \beta_2 (\text{FAM_OWN}_{it})^2 + \beta_3 \text{GOV_DUM}_{it} + \beta_4 \text{GOV_DUM}_{it} * \text{FAM_OWN}_{it} \\ & + \beta_5 \text{GOV_DUM}_{it} * (\text{FAM_OWN}_{it})^2 + \beta_6 \text{SIZE}_{it} + \beta_7 \text{ROA}_{it} + \beta_8 \text{LEV}_{it} + \beta_9 \text{GROWTH}_{it} + \beta_{10} \text{LOSS}_{it} + \beta_{11} \text{F_AGE}_{it} \\ & + \beta_{12} \text{AUD_FEE}_{it} + \beta_{13} \text{B_SIZE}_{it} + \beta_{14} \text{B_MEET}_{it} + \epsilon_{it} \end{aligned}$$

where: FAM_OW = proportion of common stock owned by the family members; GOV_DUM = dummy variable coded with the value of one if the composite governance score is more than or equal to the respective industry median, zero if otherwise; and all other variables as previously defined.

Our second hypothesis states that there remains a significant difference between strong governance and weak governance firms with respect to the curvilinear relationship of family ownership and different REMs proxies. To capture the statistical evidence, the GOV_DUM is interacted with the squared family ownership (FAM_OW) variable. A significant coefficient of this quadratic interaction term, β_5 , provides evidence of a difference between strong and weak governance firms. The coefficient of the squared FAM_OW, β_2 , indicates the curvilinear relationship of family ownership and REMs proxies for weak governance firms, and any non-significance of this coefficient suggests the non-existence of a curvilinear relationship for weaker governance firms. Model 2 also includes the main effects of the quadratic term and the lower order interaction to avoid misspecification of the model.

4. Results

4.1. Descriptive statistics

Panel A and Panel B of Table 2 summarise the descriptive statistics for the key variables of this study for non-family and family firms respectively. Overall, family firms report lower AB_CFO, AB_DISC, and REM_1 than their non-family counterparts. Since lower values of these REMs proxies indicate higher magnitude of REMs, family firms are more likely to suppress these indicators to report higher earnings. On the other hand, AB_PROD is lower in family firms compared to that of non-family firms. However, higher REM_2 in family firms is documented for the study period.

The average IND_DIR (proportion of independent directors) is 0.1725 in family firms and 0.1580 in non-family firms.¹ The mean value of T_Asset (total assets) for non-family firms is BDT 8585 million, which is more than twice the value of total assets of family firms BDT 4082 million. This is expected since family firms are generally smaller than non-family firms. ROA in family firms are higher than that of non-family firms. Non-family firms have higher debt than family firms. The average sales growth is negative for both family and non-family firms.

4.2. Correlation matrix

Table 3 reports the Pearson pairwise correlation estimates. The correlation between the family dummy FAM and all the REMs proxies are in the expected directions and they are significant for AB_DISC and REM_1. It is also documented that the family firms are negatively correlated with firm size, leverage, firm age, audit fee, board size, and number of board meetings during the study period.

The proportion of independent directors on the board (IND_DIR) shows a significant association in the expected direction with abnormal discretionary expenses (AB_DISC), REM_1, abnormal production costs (AB_PROD), and REM_2. Moreover, different REMs measures indicate a significant association with performance, leverage, firm age, financial distress and audit fee using the Pearson correlation estimates. These correlations justify including these variables as control variables in different models employed in our study.

4.3. REMs and board's independence

The interaction term REFORM*FAM*IND_DIR is the test variable that captures the difference in the effectiveness of board independence in mitigating REMs between family and non-family firms following the corporate governance reform in 2012. It is expected that board independence is more effective in restricting REMs in family firms, compared to non-family firms, in the post-reform rather than the pre-reform period. Hence, the sign of the coefficient of REFORM*FAM*IND_DIR is required to be positive for AB_CFO, AB_DISC, REM_1 and negative for AB_PROD, and REM_2, respectively.

Table 4 presents the industry year fixed effect regression results of Model 1. All the REMs models are significant at $p < .001$. The adjusted R-squared range from 0.112 to 0.206. The interaction term FAM*IND_DIR reports the comparative effectiveness of board

¹ The un-tabulated statistics show that in family firms the average IND_DIR was 0.1173 during the pre-reform period and 0.2231 in the post-reform, whereas this statistic for non-family firms increased from 0.1128 to 0.2129.

Table 2
Descriptive statistics.

Variable	Mean	S.D.	Min	Med	Max
Panel A: Non-family firms ($N = 499$)					
AB_CFO	0.0024	0.1060	-0.5237	0.0030	0.3520
AB_DISC	0.0163	0.0910	-0.2548	-0.0027	0.5135
REM_1	0.0187	0.1350	-0.5306	0.0041	0.5004
AB_PROD	0.0077	0.1617	-0.4344	0.0019	2.2644
REM_2	-0.0085	0.1976	-0.6236	0.0175	2.2257
FAM_OWN	0.0052	0.0195	0.0000	0.0000	0.0998
IND_DIR	0.1580	0.1307	0.0000	0.1429	1.0000
GOV	2.6814	1.8227	0.0000	2.9918	6.6199
SIZE	21.1887	1.7670	18.1423	20.8325	25.6503
T_ASSET	8585.0830	20,280.0700	75.7010	1115.4830	137,971.0000
ROA	0.0284	0.1671	-1.5423	0.0367	0.4792
LEV	0.8106	1.2320	0.0181	0.5705	13.0817
GROWTH	-0.0488	1.6374	-32.1156	0.0891	1.0000
AGE	30.1854	13.7097	6.0000	28.0000	67.0000
F_AGE	3.2923	0.5005	1.7918	3.3322	4.2047
AUD_FEE	11.6565	0.9996	9.6158	11.4076	14.3456
AUD_FEE_BDT	0.2002	0.2496	0.0150	0.0900	1.6990
BD_SIZE	7.8417	2.0838	3.0000	8.0000	14.0000
BD_MEET	8.8771	6.0436	1.0000	6.0000	45.0000
Panel B: Family firms ($N = 815$)					
AB_DISC	-0.0071	0.0705	-0.3017	-0.0080	0.6332
REM_1	-0.0099	0.1132	-0.5672	-0.0027	0.6958
AB_PROD	-0.0049	0.1292	-0.7432	-0.0029	1.1425
REM_2	0.0022	0.1651	-0.8466	-0.0032	1.1350
FAM_OWN	0.3743	0.1441	0.1013	0.3640	0.7638
IND_DIR	0.1725	0.0888	0.0000	0.1667	0.8000
GOV	2.6691	1.3794	0.0000	2.7898	5.8391
SIZE	20.9153	1.6014	16.6331	20.8258	25.4332
T_ASSET	4081.9540	9582.0520	16.7370	1107.9990	111,049.0000
ROA	0.0381	0.0533	-0.2423	0.0287	0.3684
LEV	0.5228	0.3424	-5.7151	0.5105	1.7116
GROWTH	-0.0422	2.1935	-59.6496	0.0753	1.0000
AGE	25.5424	10.9079	5.0000	25.0000	60.0000
F_AGE	3.1386	0.4726	1.6094	3.2189	4.0943
AUD_FEE	11.4942	1.0397	9.2103	11.4076	15.2795
AUD_FEE_BDT	0.1794	0.2844	0.0100	0.0900	4.3230
BD_SIZE	6.9765	2.0155	3.0000	7.0000	18.0000
BD_MEET	7.8083	4.6850	4.0000	6.0000	50.0000

AB_CFO is the abnormal cash flows from operations; AB_DISC is the abnormal discretionary expenses; REM_1 is the aggregate of AB_CFO and AB_DISC; AB_PROD is the abnormal production costs; REM_2 is the aggregate of A_PROD and AB_DISC; FAM_OWN is the proportion of equity shares held by family; IND_DIR is the proportion of independent directors on the board; GOV is the composite internal corporate governance score; SIZE is the natural logarithm of total assets of the current period; T_ASSET is the amount of total assets in the current period in BDT million; ROA is the ratio of net income to total assets of the current period; LEV is the ratio of total debt to total asset of the current period; GROWTH is the sales growth rate for the current period; AGE is the number of years since the firm is incorporated; F_AGE is the natural log of number of years since the firm is incorporated; AUD_FEE is the natural logarithm of current period's audit fee; AUD_FEE_BDT is the current period's audit fee in BDT million; BD_SIZE is the number of board members; BD_MEET is the number of board meetings.

independence between family and non-family firms during the pre-reform period. Except in the case of AB_CFO, independent directors are less effective in family firms for all other REMs measures during the pre-reform period. However, and more specifically, the first hypothesis proposes that this effectiveness significantly improves in family firms during to post-reform period compared to that of non-family firms and that is to be supported by the significant coefficient of the interaction term REFORM*FAM*IND_DIR. Our results support the hypothesis for all REMs proxies except AB_CFO.

Column (1) of Table 4 reports the coefficient of the interaction term REFORM*FAM*IND_DIR is not statistically significant when AB_CFO is the dependent variable. This indicates that there is no significant difference between family and non-family firms as regards the effectiveness of board independence in mitigating REMs by reducing cash flows from operations due to the corporate governance reform.

Board independence in family firms seems to be more effective mitigating factor during the post-reform period when REMs is measured by abnormal discretionary expenses. It is apparent from the reported results that the coefficient of the interaction term is 0.558 and this is significant at 1% level ($t = 5.836$). Similar evidence is documented for the aggregate of AB_CFO and AB_DISC, REM_1, in Column (3) of Table 4.

Since the higher the level of AB_PROD and REM_2 indicate the higher the magnitude of REMs, significant negative coefficients of

Table 3
Correlation matrix.

	AB_CFO	AB_DISC	REM_1	AB_PROD	REM_2	FAM	IND_DIR	GOV
AB_CFO	1							
AB_DISC	0.00990	1						
REM_1	0.760***	0.657***	1					
AB_PROD	-0.330***	-0.222	-0.393***	1				
REM_2	-0.269***	-0.625***	-0.609***	-0.0431	1			
FAM	-0.0271	-0.143***	-0.113***	-0.0608*	0.900***	1		
IND_DIR	0.0314	0.0600*	0.0627*	-0.120***	-0.0756**	0.0657*	1	
GOV	0.0730**	0.146***	0.150***	-0.308***	-0.161***	-0.00383	0.609***	1
SIZE	0.0494	0.00756	0.0421	-0.0477	-0.0415	-0.0771**	0.0607*	0.405***
ROA	0.428***	0.0655*	0.365***	-0.308***	-0.276***	-0.00168	0.0668*	0.209***
LEV	-0.335***	0.144***	-0.158***	0.252	0.137***	-0.183***	-0.0765**	-0.115***
GROWTH	0.0324	0.0990***	0.0887*	-0.0221	-0.0620*	-0.0119	-0.0422	0.0123
LOSS	-0.188***	0.0292	-0.123***	0.124***	0.0859*	-0.105***	-0.000599	-0.138***
F_AGE	0.00171	0.211***	0.138***	-0.0156	-0.107***	-0.152***	0.0967***	0.158***
AUD_FEE	0.0907**	0.188***	0.190***	-0.132***	-0.190***	-0.0778*	0.204**	0.499***
B_SIZE	0.00291	0.136***	0.0907**	-0.0333	-0.0876**	-0.206***	-0.161***	0.185***
B_MEET	0.0543	-0.0400	0.0149	-0.00629	0.0129	-0.0739**	-0.00868	0.157***

	SIZE	ROA	LEV	GROWTH	LOSS	F_AGE	AUD_FEE	B_SIZE	B_MEET
AB_CFO	1								
AB_DISC	0.263***	1							
REM_1	-0.149***	-0.687***	1						
AB_PROD	0.0934***	0.259***	-0.0755**	1					
REM_2	-0.193***	-0.500***	0.410***	-0.0761**	1				
FAM	0.0356	-0.00496	0.229***	-0.0721*	0.00611	1			
IND_DIR	0.723***	0.328	-0.161***	0.0825**	-0.164***	0.0668*	1		
GOV	0.299***	0.0857**	0.0573*	0.0262	-0.0231	0.0717*	0.266***	1	
SIZE	1								
ROA	0.235***	1							
LEV	-0.149***	-0.687***	1						
GROWTH	0.0934***	0.259***	-0.0755**	1					
LOSS	-0.193***	-0.500***	0.410***	-0.0761**	1				
F_AGE	0.0356	-0.00496	0.229***	-0.0721*	0.00611	1			
AUD_FEE	0.723***	0.328	-0.161***	0.0825**	-0.164***	0.0668*	1		
B_SIZE	0.299***	0.0857**	0.0573*	0.0262	-0.0231	0.0717*	0.266***	1	
B_MEET	0.235***	0.127***	-0.123***	0.0240	-0.132***	0.00845	0.0871**	0.0558*	1

AB_CFO is the abnormal cash flows from operations; AB_DISC is the abnormal discretionary expenses; REM_1 is the aggregate of AB_CFO and AB_DISC; A_PROD is the abnormal production costs; REM_2 is the aggregate of AB_PROD and AB_DISC; FAM is the family dummy variable coded with one if a firm is considered to be family firm, zero if otherwise; IND_DIR is the proportion of independent directors on the board; GOV is the composite score of internal corporate governance; SIZE is the natural logarithm of total assets of the current period; ROA is the ratio of net income to total assets of the current period; LEV is the ratio of total debt to total asset of the current period; GROWTH is the sales growth rate for the current period; F_AGE is the natural log of number of years since the firm is incorporated; LOSS is a dummy variable coded with a value of one if the firm incurs loss during the previous period, zero if otherwise; AUD_FEE is the natural logarithm of current period's audit fee; B_SIZE is the natural logarithm of the number of board members; B_MEET is the natural logarithm of the number of board meetings.

* $p < .05$.
 ** $p < .01$.
 *** $p < .001$.

Table 4
CG Reform, board independence in family firms and REMs.

VARIABLES	Exp. sign	(1)	(2)	(3)	Exp. Sign	(4)	(5)
		AB_CFO	AB_DISC	REM_1		AB_PROD	REM_2
Constant	+/-	0.0526 (1.244)	-0.211*** (-5.751)	-0.158*** (-2.826)	+/-	0.100 (1.455)	0.310*** (3.662)
REFORM	+	0.00826 (0.512)	0.0338** (2.416)	0.0420** (1.970)	-	-0.0119 (-0.421)	-0.0321 (-0.922)
FAM	+/-	-0.0129 (-1.043)	0.0519*** (4.838)	0.0390** (2.380)	+/-	-0.0453** (-2.207)	-0.100*** (-3.973)
IND_DIR	+/-	-0.0110 (-0.183)	0.320*** (6.118)	0.309*** (3.868)	+/-	-0.237** (-2.399)	-0.555*** (-4.576)
REFORM*FAM	+/-	-0.0237 (-1.146)	-0.0790*** (-4.403)	-0.103*** (-3.750)	+/-	0.100*** (2.950)	0.183*** (4.381)
REFORM*IND_DIR	+/-	-0.0365 (-0.522)	-0.300*** (-4.947)	-0.337*** (-3.635)	+/-	0.301*** (2.634)	0.602*** (4.276)
FAM*IND_DIR	-	0.0191 (0.218)	-0.518*** (-6.843)	-0.499*** (-4.317)	+	0.309*** (2.138)	0.850*** (4.784)
REFORM*FAM*IND_DIR	+	0.103 (0.934)	0.558*** (5.836)	0.661*** (4.529)	-	-0.631*** (-3.481)	-1.214*** (-5.443)
SIZE	+/-	-0.00167 (-0.690)	-0.0155*** (-7.383)	-0.0171*** (-5.358)	+/-	0.00887** (2.248)	0.0247*** (5.098)
ROA	+/-	0.507*** (10.11)	0.121*** (2.779)	0.628*** (9.466)	+/-	-0.457*** (-5.514)	-0.580*** (-5.690)
LEV	-	-0.0208*** (-3.016)	0.0302*** (5.056)	0.00939 (1.031)	+	0.0351*** (3.122)	0.00482 (0.349)
GROWTH	+/-	-0.0207** (-2.573)	0.0225*** (3.227)	0.00180 (0.168)	+/-	0.0210 (1.591)	-0.00124 (-0.0762)
LOSS	-	0.0110 (1.268)	0.00618 (0.825)	0.0171 (1.499)	+	-0.0230 (-1.637)	-0.0292* (-1.684)
F_AGE	+	0.00298 (0.544)	0.0255*** (5.371)	0.0285*** (3.929)	-	-0.0135 (-1.487)	-0.0391*** (-3.506)
AUD_FEE	+	-0.00104 (-0.263)	0.0291*** (8.500)	0.0280*** (5.369)	-	-0.0178*** (-2.754)	-0.0476*** (-5.989)
B_SIZE	+	-0.00405 (-0.422)	0.0302*** (3.645)	0.0262** (2.068)	-	-0.0192 (-1.227)	-0.0491** (-2.554)
B_MEET	+	-0.00111 (-0.209)	0.00769* (1.661)	0.00658 (0.930)	-	0.00765 (0.872)	0.000572 (0.0530)
Industry year fixed effect		Yes	Yes	Yes		Yes	Yes
Observations		1258	1258	1258		1247	1247
Adjusted R-squared		0.200	0.188	0.206		0.112	0.138
F test		13.91	12.99	14.38		7.585	9.328

REM = $\beta_0 + \beta_1 \text{REFORM} + \beta_2 \text{FAM}_{it} + \beta_3 \text{IND_DIR}_{it} + \beta_4 \text{REFORM} * \text{FAM}_{it} + \beta_5 \text{REFORM} * \text{IND_DIR}_{it} + \beta_6 \text{FAM}_{it} * \text{IND_DIR}_{it} + \beta_7 \text{REFORM} * \text{FAM}_{it} * \text{IND_DIR}_{it} + \beta_8 \text{SIZE}_{it} + \beta_9 \text{ROA}_{it} + \beta_{10} \text{LEV} + \beta_{11} \text{GROWTH}_{it} + \beta_{12} \text{LOSS}_{it} + \beta_{13} \text{F_AGE}_{it} + \beta_{14} \text{AUD_FEE}_{it} + \beta_{15} \text{B_SIZE}_{it} + \beta_{16} \text{B_MEET}_{it} + \epsilon_{it}$. Where, REMs is the proxies for AB_CFO, AB_DISC, REM_1, AB_PROD, REM_2; REFORM is the dummy variable coded with one if the observation is from post-reform period, zero if otherwise; FAM is the family dummy variable coded with one if a firm is considered to be family firm, zero if otherwise; IND_DIR is the proportion of independent directors on the board; SIZE is the natural logarithm of total assets of the current period; ROA is the ratio of net income to total assets of the current period; LEV is the ratio of total debt to total asset of the current period; GROWTH is the sales growth rate for the current period; LOSS is a Dummy variable coded with a value of one if the firm incurs loss during the previous period, zero if otherwise; F_AGE is the natural log of number of years since the firm is incorporated; AUD_FEE is the natural logarithm of current period's audit fee; B_SIZE is the natural logarithm of the number of board members; B_MEET is the natural logarithm of the number of board meetings. Superscripts***, **, * represent significance level at 1%, 5% and 10%, respectively. t-statistics are in parentheses.

our interaction of interest support our first hypothesis. The statistically significant coefficients β_7 for AB_PROD and REM_2 with expected sign suggest that the effectiveness of independent directors in family firms is significantly higher than that of non-family firms following the reform in Bangladesh. The likelihood of REMs increases with when firm size also increases. ROA, as proxy for performance, exhibits a negative association with REMs. High performance firms are negatively associated with the magnitudes of different REMs. Firm age is also found to have a significant negative association with different REMs proxies other than AB_CFO and AB_PROD. Our results show that higher audit fee is inversely associated with the level of REMs in terms of AB_DISC, REM_1 and REM_2. The board size is found to have negative association with AB_DISC, REM_1, and REM_2.

These regression results support the proposition that the effectiveness of board independence is significantly higher in restricting family firms' REMs behaviour compared to non-family firms after the corporate governance reform.

4.4. Propensity score matching

Family firms may vary from non-family firms with respect to size, performance, debt structure, growth, age, audit fee, and board size. We employ propensity score matching to control for the difference between family and non-family firms and to address the endogeneity concern (Rosenbaum and Rubin, 1983). We run a logit estimation of FAM (family dummy) on control variables of our baseline model. We also add the PUB_OWNS (proportion of equity held by general investors) and its square term since family firms in Bangladesh has relatively higher individual general investor equity holdings.

To construct our match sample, we find a “nearest neighbour” of non-family firms without replacement. Our sample of family firms and propensity score matched non-family firms is 502 observations out of our total sample of 1314 observations. We conduct our analysis of effectiveness of board independence in family firms from pre to post-reform period compared to non-family firms using the propensity score matched sample. The outcome of this analysis is reported in Table 5. Panel A of Table 5 reports the difference in means test for the matched sample and unmatched sample. For unmatched sample, family firms significantly vary from non-family firms for most of the firm characteristics. However, family firms do not differ with respect to employed explanatory variables from non-family firms in matched sample.

Panel B of Table 5 presents the outcome of multivariate analysis of propensity score matched sample. The coefficient of interaction term REFORM*FAM*IND_DIR is highly significant and in expected direction for REMs measures except AB_CFO. This highlights the fact that board independence in family firms is more effective in restricting real earnings management in the post-reform period compared to the non-family firms. This is consistent with the findings reported in Table 4.

4.5. Difference-in-difference test

We also conduct a difference-in-difference test to investigate the impact of corporate governance reform on family *vis-à-vis* non-family firms with respect to the board independence effectiveness in mitigating REMs. The reform requires all the listed firms in Bangladesh to maintain a minimum proportion of independent directors of 20% that is double the previous minimum of 10%. We select a treatment group of firms that have proportion of independent directors < 20% in the pre-reform period and a proportion equal to or > 20% during the post-reform period, and develop a variable TREATED with value one if a firm meets this condition, zero otherwise. Hence, the control group consists of firms that do not have the proportion increased from below to 20% or higher after the reform.

Propensity score matching with no replacement is employed to find a “nearest neighbour” of TREATED. In this process, we use size, performance, debt, growth, financial distress, firm age, board size, and lagged GOV_SCORE (composite governance score) as explanatory variables in estimating the propensity score of TREATED. Our sample of TREATED and propensity score matched non-treated firms consists 806 observations. Un-tabulated difference in means tests show that our treatment firms are not significantly different from the control firms with respect to the explanatory variables used in the propensity score matching.

We conduct a multivariate analysis using the difference-in-difference technique to examine impact of corporate governance shock in terms of increased number of independent directors on board in restricting firms REMs. The following model is used to conduct this investigation.

$$\begin{aligned} \text{REM} = & \beta_0 + \beta_1 \text{REFORM}_{it} + \beta_2 \text{TREATED}_{it} + \beta_3 \text{FAM}_{it} + \beta_4 \text{REFORM}_{it} * \text{TREATED}_{it} + \beta_5 \text{REFORM}_{it} * \text{FAM}_{it} + \beta_6 \text{TREATED}_{it} \\ & * \text{FAM}_{it} + \beta_7 \text{REFORM}_{it} * \text{TREATED}_{it} * \text{FAM}_{it} + \beta_8 \text{SIZE}_{it} + \beta_9 \text{ROA}_{it} + \beta_{10} \text{LEV}_{it} + \beta_{11} \text{GROWTH}_{it} + \beta_{12} \text{LOSS}_{it} + \beta_{13} \\ & \text{F_AGE}_{it} + \beta_{14} \text{AUD_FEE}_{it} + \beta_{15} \text{B_SIZE}_{it} + \beta_{16} \text{B_MEET}_{it} + \varepsilon_{it}. \end{aligned}$$

Our variable of interest in the analysis is the interaction between REFORM, TREATED, and FAM. The coefficient of this interaction captures the impact of governance reform between family and non-family firms in respect to restricting REMs. Table 6 shows the multivariate analysis of the difference-in-difference model. The coefficient of REFORM*TREATED*FAM is significant (at 10% level) with the expected signs when REMs is proxied by AB_DISC, REM_1, and REM_2. This supports our previous analyses that the increase in board independence have greater positive impact in family firms in restricting their REMs compared to non-family firms.

We also conduct a placebo test by setting the year 2010 as the corporate governance reform year. Our un-tabulated results show that the REFORM*TREATED*FAM is not significant for any REMs proxies. This provides evidence that our previous results are not mechanical and time-driven.

4.6. Additional tests

As an additional test, we conduct multivariate analysis on pre-reform and post-reform sub-samples separately. Panel A of Table 7 reports the regression estimates of the pre-reform sub-samples. IND_DIR reflects the impact of the independent directors in restricting REMs in non-family firms. Except AB_CFO, the coefficient of the IND_DIR is highly significant and has directional opposite sign for all REMs. This is suggestive of the fact that independent directors on non-family firms' board are highly effective concerning REMs during the pre-reform period. However, the coefficient of the interaction term FAM*IND_DIR reflects that more independent boards in family firms are less effective in restricting REMs before the corporate governance reform period. This is consistent with the earlier evidence in an accruals earnings management context (Jaggi et al., 2009; Prencipe and Bar-Yosef, 2011).

Panel B of Table 7 shows the regression outcomes on post-reform sub-samples. The coefficient of the interaction term is significant and has directional opposite sign for all REM proxies other than AB_DISC. This highlights that the independent directors in family

Table 5
PSM-CG reform, board independence in family firms and REMs.

Variable	Matched sample			Unmatched sample		
	Family firms means	Non-family firms means	Difference in means t-statistic	Family firms means	Non-family firms means	Difference in means t-statistic
SIZE	20.979	20.881	1.04	20.939	21.116	-2.01**
ROA	0.04047	0.04029	0.05	0.03834	0.04489	-1.72*
LEV	0.54367	0.53058	0.74	0.53042	0.63288	-5.36***
GROWTH	0.06662	0.06924	-0.24	0.06485	0.07986	-1.56
LOSS	0.09167	0.11875	-0.24	0.09091	0.16082	-3.77***
F_AGE	3.176	3.216	-1.41	3.125	3.2916	-5.89***
AUD_FEE	11.47	11.44	0.49	11.487	11.66	-2.95***
B_SIZE	1.935	1.9314	0.21	1.9047	2.0236	-7.60***
PUB_OWEN	0.36157	0.37388	-1.17	0.37149	0.33034	3.86***
(PUB_OWEN) ²	0.15759	0.16562	0.21	0.16267	0.1578	0.56

Panel B: PSM regression estimates

VARIABLES	Exp. Sign	(1)	(2)	(3)	Exp. sign	(4)	(5)
		AB_CFO	AB_DISC	REM_1		AB_PROD	REM_2
Constant	+/-	0.0316 (0.443)	-0.204*** (-3.959)	-0.172** (-1.998)	+/-	0.0702 (0.790)	0.272** (2.394)
REFORM	+	0.00372 (0.136)	-0.00149 (-0.0759)	0.00223 (0.0678)	-	0.0141 (0.415)	0.0149 (0.343)
FAM	+/-	-0.0141 (-0.656)	0.0500*** (3.233)	0.0359 (1.388)	+/-	-0.0449 (-1.624)	-0.0991*** (-2.810)
IND_DIR	+/-	-0.0125 (-0.143)	0.308*** (4.886)	0.295*** (2.801)	+/-	-0.103 (-0.948)	-0.409*** (-2.950)
REFORM*FAM	+/-	-0.0361 (-1.086)	-0.0569** (-2.378)	-0.0929** (-2.322)	+/-	0.126*** (3.009)	0.187*** (3.492)
REFORM*IND_DIR	+/-	-0.0998 (-1.016)	-0.278*** (-3.922)	-0.377*** (-3.186)	+/-	0.184 (1.504)	0.458*** (2.939)
FAM*IND_DIR	-	-0.00107 (-0.00689)	-0.516*** (-4.611)	-0.517*** (-2.761)	+	0.188 (0.951)	0.731*** (2.888)
REFORM*FAM*IND_DIR	+	0.241 (1.315)	0.476*** (3.600)	0.717*** (3.242)	-	-0.581** (-2.498)	-1.083*** (-3.648)
SIZE	+/-	-0.00537 (-1.235)	-0.0153*** (-4.872)	-0.0207*** (-3.935)	+/-	0.00907* (1.673)	0.0245*** (3.545)
ROA	+/-	0.468***	0.150**	0.618***	+/-	-0.370***	-0.523***

(continued on next page)

Table 5 (continued)

Panel B: PSM regression estimates

VARIABLES	(1)	(2)	(3)	(4)	(5)
	AB_CFO	AB_DISC	REM_1	AB_PROD	REM_2
LEV	(4.909) -0.0228 (-1.292)	(2.179) -0.00503 (-0.396)	(5.374) -0.0278 (-1.309)	(-3.111) 0.0767*** (3.496)	(-3.448) 0.0821*** (2.934)
GROWTH	-0.0323 (-1.269)	0.0572*** (3.114)	0.0248 (0.808)	0.0332 (1.042)	-0.0222 (-0.547)
LOSS	-0.00386 (-0.269)	0.0303*** (2.927)	0.0264 (1.526)	-0.0402** (-2.252)	-0.0704*** (-3.091)
F_AGE	0.00967 (0.946)	0.0284*** (3.863)	0.0381*** (3.093)	-0.0127 (-0.986)	-0.0403** (-2.442)
AUD_FEE	0.00616 (0.869)	0.0279*** (5.448)	0.0340*** (3.976)	-0.0210** (-2.375)	-0.0492*** (-4.357)
B_SIZE	-0.00890 (-0.554)	0.0343*** (2.957)	0.0254 (1.308)	0.00696 (0.347)	-0.0273 (-1.066)
B_MEET	-0.00332 (-0.368)	0.0111* (1.704)	0.00776 (0.713)	-0.00624 (-0.551)	-0.0170 (-1.175)
Industry year fixed effect	Yes	Yes	Yes	Yes	Yes
Observations	500	500	500	497	497
Adjusted R-squared	0.0673	0.211	0.191	0.0818	0.155
F test	2.759	6.663	6.028	3.088	4.955

$REM = \beta_0 + \beta_1 REFORM_{it} + \beta_2 FAM_{it} + \beta_3 IND_DIR_{it} + \beta_4 REFORM_{it} * FAM_{it} + \beta_5 REFORM_{it} * IND_DIR_{it} + \beta_6 FAM_{it} * IND_DIR_{it} + \beta_7 REFORM_{it} * FAM_{it} * IND_DIR_{it} + \beta_8 ROA_{it} + \beta_9 LEV_{it} + \beta_{10} LEV_{it} + \beta_{11} GROWTH_{it} + \beta_{12} LOSS_{it} + \beta_{13} F_AGE_{it} + \beta_{14} AUD_FEE_{it} + \beta_{15} B_SIZE_{it} + \beta_{16} MEET_{it} + \epsilon_{it}$. Where, REMs is the proxies for AB_CFO, AB_DISC, REM_1, AB_PROD, REM_2; REFORM is the dummy variable coded with one if the observation is from post-reform period, zero if otherwise; FAM is the family dummy variable coded with one if a firm is considered to be family firm, zero if otherwise; IND_DIR is the proportion of independent directors on the board; SIZE is the natural logarithm of total assets of the current period; ROA is the ratio of net income to total assets of the current period; LEV is the ratio of total debt to total asset of the current period; GROWTH is the sales growth rate for the current period; LOSS is a Dummy variable coded with a value of one if the firm incurs loss during the previous period, zero if otherwise; F_AGE is the natural log of number of years since the firm is incorporated; AUD_FEE is the natural logarithm of current period's audit fee; B_SIZE is the natural logarithm of the number of board members; B_MEET is the natural logarithm of the number of board meetings; PUB_OWN is the proportion of equity ownership held by general investors. Superscripts ***, **, * represent significance level at 1%, 5% and 10%, respectively. t-statistics are in parentheses.

Table 6
Difference-in-difference.

VARIABLES	Exp. sign	(1)	(2)	(3)	Exp. sign	(4)	(5)
		AB_CFO	AB_DISC	REM_1		AB_PROD	REM_2
Constant	+/-	0.0876** (1.989)	-0.171*** (-4.908)	-0.0830 (-1.523)	+/-	0.0275 (0.499)	0.198*** (2.713)
REFORM	+	0.00699 (0.505)	-0.00469 (-0.429)	0.00230 (0.134)	-	0.0152 (0.855)	0.0295 (1.247)
TREATED	+/-	0.0186 (1.395)	-0.00462 (-0.439)	0.0140 (0.847)	+/-	-0.0275* (-1.650)	-0.0228 (-1.030)
FAM	+/-	-0.00849 (-0.933)	-0.00951 (-1.325)	-0.0180 (-1.599)	+/-	-0.0158 (-1.378)	-0.00596 (-0.392)
REFORM*TREATED	+/-	-0.0282 (-1.448)	-0.0259* (-1.685)	-0.0541** (-2.245)	+/-	0.0193 (0.793)	0.0453 (1.406)
REFORM*FAM	+/-	-0.00373 (-0.299)	-0.0131 (-1.330)	-0.0168 (-1.090)	+/-	0.0125 (0.801)	0.0252 (1.212)
TREATED*FAM	+/-	-0.00953 (-0.608)	-0.00254 (-0.206)	-0.0121 (-0.623)	+/-	0.0225 (1.148)	0.0248 (0.951)
REFORM*TREATED*FAM	+	0.0200 (0.867)	0.0355* (1.951)	0.0555* (1.945)	-	-0.0310 (-1.076)	-0.0663* (-1.732)
SIZE	+/-	-0.00142 (-0.565)	-0.0127*** (-6.395)	-0.0141*** (-4.535)	+/-	0.0896*** (2.843)	0.0219*** (5.231)
ROA	+/-	0.492*** (9.242)	0.138*** (3.277)	0.630*** (9.558)	+/-	-0.571*** (-8.481)	-0.711*** (-7.954)
LEV	-	-0.0363*** (-3.711)	0.00659 (0.854)	-0.0297** (-2.454)	+	0.0470*** (3.843)	0.0406** (2.503)
GROWTH	+/-	-0.0308** (-1.963)	0.0476*** (3.846)	0.0168 (0.867)	+/-	0.0504** (2.557)	0.00264 (0.101)
LOSS	-	0.00215 (0.242)	0.0151** (2.167)	0.0173 (1.578)	+	-0.0143 (-1.290)	-0.0296** (-2.018)
F_AGE	+	0.00183 (0.328)	0.0282*** (6.401)	0.0301*** (4.347)	-	-0.0101 (-1.421)	-0.0394*** (-4.168)
AUD_FEE	+	-0.00304 (-0.746)	0.0261*** (8.142)	0.0231*** (4.590)	-	-0.0162*** (-3.161)	-0.0426*** (-6.286)
B_SIZE	+	-0.00521 (-0.543)	0.0287*** (3.793)	0.0235** (1.980)	-	-0.00917 (-0.762)	-0.0377** (-2.363)
B_MEET	+	-0.00445 (-0.817)	-0.00150 (-0.349)	-0.00595 (-0.882)	-	0.00722 (1.051)	0.00958 (1.050)
Industry year fixed effect		Yes	Yes	Yes		Yes	Yes
Observations		804	804	804		800	800
Adjusted R-squared		0.138	0.151	0.191		0.147	0.163
F test		9.377	10.31	13.23		9.937	11.06

$REM = \beta_0 + \beta_1 REFORM_{it} + \beta_2 TREATED_{it} + \beta_3 FAM_{it} + \beta_4 REFORM_{it} * TREATED_{it} + \beta_5 REFORM_{it} * FAM_{it} + \beta_6 TREATED_{it} * FAM_{it} + \beta_7 REFORM_{it} * TREATED_{it} * FAM_{it} + \beta_8 SIZE_{it} + \beta_9 ROA_{it} + \beta_{10} LEV_{it} + \beta_{11} GROWTH_{it} + \beta_{12} LOSS_{it} + \beta_{13} F_AGE_{it} + \beta_{14} AUD_FEE_{it} + \beta_{15} B_SIZE_{it} + \beta_{16} B_MEET_{it} + \epsilon_{it}$. Where, REMs is the proxies for AB_CFO, AB_DISC, REM_1, AB_PROD, REM_2; REFORM is the dummy variable coded with one if the observation is from post-reform period, zero if otherwise; TREATED is a dummy variable coded with one if the proportion of independent director is < 20% during the pre-reform and equals to or > 20% during post-reform period, zero if otherwise; FAM is the family dummy variable coded with one if a firm is considered to be family firm, zero if otherwise; ROA is the ratio of net income to total assets of the current period; LEV is the ratio of total debt to total asset of the current period; GROWTH is the sales growth rate for the current period; LOSS is a Dummy variable coded with a value of one if the firm incurs loss during the previous period, zero if otherwise; F_AGE is the natural log of number of years since the firm is incorporated; AUD_FEE is the natural logarithm of current period's audit fee; B_SIZE is the natural logarithm of the number of board members; B_MEET is the natural logarithm of the number of board meetings. Superscripts***, **, * represent significance level at 1%, 5% and 10%, respectively. t-statistics are in parentheses.

firms are more effective in lowering REMs in comparison to non-family firms after the corporate governance reform. This sub-sample analysis provides further corroboration of our results regarding the increased effectiveness of family firms' independent directors post-reform compared to non-family firms.

4.7. Endogeneity of family firms, board independence and REMs on sub-samples

The issue of earnings management in family firms may have endogeneity concerns (Jaggi et al., 2009) and we address this on our sub-sample analysis. We employ a family dummy (FAM) and its interaction with the proportion of independent directors (IND_DIR) to investigate the effectiveness of board independence in restricting REMs. Since FAM as a proxy for family ownership is a dummy variable, treatment effect model with maximum likelihood is used to address the endogeneity (Guo and Fraser, 2014). In the selection

Table 7
REMs and board independence (Sub-sample).

VARIABLES	Exp. sign	(1)	(2)	(3)	Exp. Sign	(4)	(5)
		AB_CFO	AB_DISC	REM_1		AB_PROD	REM_2
Panel A: Pre reform sub-sample							
Constant	+ / -	0.0901 (1.461)	-0.155*** (-3.158)	-0.0647 (-0.826)	+ / -	0.0440 (0.482)	0.197* (1.734)
FAM	+ / -	-0.0163 (-1.209)	0.0563*** (5.245)	0.0400** (2.330)	+ / -	-0.0492** (-2.430)	-0.108*** (-4.284)
IND_DIR	+	-0.0325 (-0.484)	0.353*** (6.605)	0.320*** (3.752)	-	-0.258*** (-2.589)	-0.607*** (-4.896)
FAM*IND_DIR	-	0.0300 (0.313)	-0.567*** (-7.463)	-0.537*** (-4.423)	+	0.354** (2.476)	0.937*** (5.279)
Controls		Yes	Yes	Yes		Yes	Yes
Industry year fixed effect		Yes	Yes	Yes		Yes	Yes
Observations		672	672	672		662	662
Adjusted R-squared		0.187	0.207	0.228		0.118	0.169
F test		10.54	11.77	13.16		6.668	9.390
Panel B: Post reform sub-sample							
Constant	+ / -	0.0435 (0.724)	-0.220*** (-3.809)	-0.176** (-2.109)	+ / -	0.140 (1.274)	0.360*** (2.683)
FAM	+ / -	-0.0404** (-2.389)	-0.0285* (-1.755)	-0.0688*** (-2.930)	+ / -	0.0588* (1.903)	0.0873** (2.314)
IND_DIR	+	-0.0422 (-1.095)	0.0178 (0.481)	-0.0244 (-0.455)	-	0.0733 (1.040)	0.0555 (0.645)
FAM*IND_DIR	+	0.135** (2.031)	0.0376 (0.589)	0.173* (1.867)	-	-0.349*** (-2.867)	-0.386*** (-2.603)
Controls		Yes	Yes	Yes		Yes	Yes
Industry year fixed effect		Yes	Yes	Yes		Yes	Yes
Observations		586	586	586		585	585
Adjusted R-squared		0.215	0.164	0.178		0.0938	0.0929
F test		11.53	8.675	9.439		5.278	5.237

REM = $\beta_0 + \beta_1 \text{FAM}_{it} + \beta_2 \text{IND_DIR}_{it} + \beta_3 \text{FAM}_{it} * \text{IND_DIR}_{it} + \beta_4 \text{SIZE}_{it} + \beta_5 \text{ROA}_{it} + \beta_6 \text{LEV}_{it} + \beta_7 \text{GROWTH}_{it} + \beta_8 \text{LOSS}_{it} + \beta_9 \text{F_AGE}_{it} + \beta_{10} \text{AUD_FEE}_{it} + \beta_{11} \text{B_SIZE}_{it} + \beta_{12} \text{B_MEET}_{it} + \epsilon_{it}$. Where, REMs is the proxies for AB_CFO, AB_DISC, REM_1, AB_PROD, REM_2; FAM is the family dummy variable coded with one if a firm is considered to be family firm, zero if otherwise; IND_DIR is the proportion of independent directors on the board; Controls are the control variables SIZE, ROA, LEV, GROWTH, LOSS, F_AGE, AUD_FEE, B_SIZE, and B_MEET. Superscripts***, **, * represent significance level at 1%, 5% and 10%, respectively. t-statistics are in parentheses.

model, FAM is estimated on the general investors' equity ownership (percentage of cumulative equity shares held by outside diffuse owners), square of the general investors' equity ownership, natural logarithm of total assets, and square of the natural logarithm of total assets. The general investors' equity ownership is the diffused ownership held by dispersed minority investors and hence, the likelihood of their association with the REMs is feasible in the presence of substantial majority shareholders. We argue that, in our study context, family owners are these substantial majority shareholders.

Panel A of Table 8 exhibits the results of the treatment effect estimated with maximum likelihood on the pre-reform sub-sample. The results presented in the panel support the conclusion drawn from fixed effect regression analyses. IND_DIR is significant for all REMs proxies with expected direction except AB_CFO. This highlights the fact that proportion of independent directors on board are associated with the magnitude of REMs inversely in non-family firms. However, the interaction of FAM and IND_DIR indicates that the negative association of REMs and independent directors in family firms are significantly lower than that of non-family firms before the reform period.

Similar to our endogeneity concern in the pre-reform period, we estimate the treatment effect model with maximum likelihood in the post-reform period. The outcomes are reported in Panel B of Table 8. From column (1), (2), and (3), it is clearly evident that there remain no significant difference in the effectiveness of board independence in restraining REMs between family and non-family firms with regard to lowering cash flow through sales manipulation, cutting down the discretionary expenses, and their joint effort to increase earnings in the post-reform period. However, the interaction term FAM*IND_DIR is found to have significant inverse association with AB_PROD and REM_2 (the aggregate of abnormal production cost and the abnormal discretionary expenses). In the post-reform period, the board independence appears to be more effective in restricting REMs for these two proxies in family firms compared to that of non-family firms. Overall, this analysis adds to the robustness of the results supporting our hypothesis that board's independence has significant positive impact in family firms during the post-reform period.

4.8. Corporate governance and the curvilinear relationship between REMs and family ownership during pre-reform period

We investigate whether the curvilinear relationship between REMs and family ownership varies significantly from strong

Table 8
REMs and board independence with treatment effect on Sub-samples.

VARIABLES	Exp. sign	(1)	(2)	(3)	Exp. Sign	(4)	(5)
		AB_CFO	AB_DISC	REM_1		AB_PROD	REM_2
Panel A: Treatment effect on pre-reform sub-sample							
Constant	+/-	0.109* (1.768)	-0.172*** (-3.322)	-0.0643 (-0.781)	+/-	-0.0166 (-0.182)	0.139 (1.207)
FAM	+/-	-0.0241 (-0.908)	0.0927*** (3.769)	0.0704* (1.724)	+/-	0.000569 (0.0148)	-0.0797 (-1.506)
IND_DIR	+	-0.0142 (-0.219)	0.365*** (7.163)	0.352*** (4.255)	-	-0.258*** (-2.714)	-0.618*** (-5.199)
FAM*IND_DIR	-	0.0176 (0.190)	-0.572*** (-7.812)	-0.556*** (-4.705)	+	0.353** (2.574)	0.936*** (5.472)
Controls		Yes	Yes	Yes		Yes	Yes
Selection model							
Constant		-13.34* (-1.861)	-11.59* (-1.646)	-12.29* (-1.688)		-13.91* (-1.953)	-13.08* (-1.802)
PUB_OW_N		6.832*** (6.923)	6.586*** (6.240)	6.825*** (6.876)		6.648*** (6.649)	6.688*** (6.722)
(PUB_OW_N) ²		-8.660*** (-6.668)	-8.741*** (-6.708)	-8.794*** (-6.807)		-8.264*** (-6.232)	-8.319*** (-6.222)
SIZE		1.252* (1.825)	1.101 (1.643)	1.153* (1.661)		1.308* (1.919)	1.227* (1.768)
(SIZE) ²		-0.0310* (-1.894)	-0.0276* (-1.729)	-0.0286* (-1.732)		-0.0323** (-1.989)	-0.0304* (-1.837)
Observations		672	672	672		662	662
Wald Chi ²		157.7	175.4	197		105.6	150.6
Panel B: Treatment effect on post-reform sub-sample							
Constant	+/-	0.0948 (1.616)	-0.143** (-2.517)	-0.0609 (-0.744)	+/-	-0.0872 (-0.773)	0.102 (0.760)
FAM	+/-	-0.0482** (-2.158)	-0.0629*** (-3.048)	-0.0994*** (-3.284)	+/-	0.253*** (8.321)	0.261*** (6.261)
IND_DIR	+	-0.0389 (-1.061)	0.00779 (0.224)	-0.0307 (-0.606)	-	0.0948 (1.557)	0.0854 (1.095)
FAM*IND_DIR	+	0.104 (1.622)	0.00630 (0.103)	0.113 (1.273)	-	-0.306*** (-2.763)	-0.303** (-2.177)
Controls		Yes	Yes	Yes		Yes	Yes
Selection model							
Constant		-2.717 (-0.345)	2.939 (0.382)	-1.751 (-0.226)		-1.072 (-0.173)	0.152 (0.0220)
PUB_OW_N		9.778*** (7.601)	9.799*** (7.803)	9.862*** (7.771)		6.261*** (5.931)	8.228*** (6.862)
(PUB_OW_N) ²		-11.08*** (-7.147)	-10.89*** (-7.059)	-11.08*** (-7.183)		-7.212*** (-5.620)	-9.302*** (-6.382)
SIZE		0.138 (0.187)	-0.401 (-0.561)	0.0443 (0.0614)		0.0465 (0.0808)	-0.107 (-0.166)
(SIZE) ²		-0.00354 (-0.207)	0.00913 (0.552)	-0.00136 (-0.0816)		-0.00156 (-0.117)	0.00217 (0.145)
Observations		586	586	586		585	585
Wald Chi ²		173.7	139	144.8		176.6	119.1

REM = $\beta_0 + \beta_1 \text{FAM}_{it} + \beta_2 \text{IND_DIR}_{it} + \beta_3 \text{FAM}_{it} * \text{IND_DIR}_{it} + \beta_4 \text{SIZE}_{it} + \beta_5 \text{ROA}_{it} + \beta_6 \text{LEV}_{it} + \beta_7 \text{GROWTH}_{it} + \beta_8 \text{LOSS}_{it} + \beta_9 \text{F_AGE}_{it} + \beta_{10} \text{AUD_FEE}_{it} + \beta_{11} \text{B_SIZE}_{it} + \beta_{12} \text{B_MEET}_{it} + \epsilon_{it}$. Where, REMs are the proxies for AB_CFO, AB_DISC, REM_1, AB_PROD, REM_2; FAM is the family dummy variable coded with one if a firm is considered to be family firm, zero if otherwise; IND_DIR is the proportion of independent directors on the board; Controls are the control variables SIZE, ROA, LEV, GROWTH, LOSS, F_AGE, AUD_FEE, B_SIZE, and B_MEET; SIZE is the natural logarithm of total assets of the current period; PUB_OW_N is the proportion of equity ownership held by general investors. Superscripts***, **, * represent significance level at 1%, 5% and 10%, respectively. z-statistics are in parentheses.

governance firms to weak governance firms during the pre and post-reform period in Bangladesh. A dummy variable, GOV_DUM, is employed in the model to test the impact of internal governance. GOV_DUM is coded with a value of one if the composite score of internal corporate governance (GOV_SCORE) of a firm is greater or equal to the industry median value, zero if otherwise. Any firm with GOV_DUM value of one refers to strong governance firm, whereas any firm with GOV_DUM value zero stands for the relatively weaker governance firm. A significant coefficient of the interaction term between GOV_DUM and the squared family ownership (FAM_OW_N) supports our hypothesis that there remains a significant difference between strong governance firm and weaker governance firm with respect to the curvilinear relationships between REMs and family ownership. The comparison group in the analysis

Table 9
Corporate governance and curvilinear relationship in pre-reform period.

VARIABLES	Exp. sign	(1)	(2)	(3)	Exp. Sign	(4)	(5)
		AB_CFO	AB_DISC	REM_1		AB_PROD	REM_2
Panel A: Fixed effect model							
Constant	+/-	0.125 (1.450)	-0.154** (-2.429)	-0.0290 (-0.262)	+/-	0.0222 (0.160)	0.190 (1.138)
GOV_DUM	+/-	-0.118** (-2.542)	0.0288 (0.845)	-0.0890 (-1.504)	+/-	0.0546 (0.742)	0.0227 (0.256)
FAM_OWN	+/-	-0.0534 (-0.435)	-0.00617 (-0.0685)	-0.0595 (-0.380)	+/-	0.192 (0.968)	0.207 (0.866)
(FAM_OWN) ²	+/-	0.0608 (0.350)	0.138 (1.081)	0.199 (0.896)	+/-	-0.328 (-1.155)	-0.483 (-1.409)
GOV_DUM*FAM_OWN	+/-	0.691** (2.491)	-0.0859 (-0.421)	0.606* (1.708)	+/-	-0.419 (-0.948)	-0.307 (-0.577)
GOV_DUM*(FAM_OWN)²	+/-	-0.780** (-2.081)	-0.0991 (-0.360)	-0.879* (-1.836)	+/-	0.662 (1.106)	0.738 (1.023)
SIZE	+/-	-0.00626 (-1.304)	-0.0996*** (-2.823)	-0.0162*** (-2.645)	+/-	0.0137* (1.782)	0.0241*** (2.611)
ROA	+/-	0.561*** (5.315)	-0.0213 (-0.275)	0.540*** (4.004)	+/-	-0.398** (-2.285)	-0.361* (-1.716)
LEV	-	-0.0416** (-2.033)	-0.0272* (-1.808)	-0.0687*** (-2.632)	+	0.0549* (1.674)	0.0831** (2.103)
GROWTH	+/-	-0.0156 (-1.013)	0.0333*** (2.930)	0.0176 (0.893)	+/-	0.0176 (0.704)	-0.0180 (-0.599)
LOSS	-	0.0119 (0.652)	0.0204 (1.522)	0.0322 (1.386)	+	-0.0270 (-0.929)	-0.0474 (-1.356)
F_AGE	+	0.00610 (0.642)	0.0287*** (4.107)	0.0348*** (2.866)	-	-0.0149 (-0.944)	-0.0456** (-2.401)
AUD_FEE	+	-0.00116 (-0.141)	0.0170*** (2.813)	0.0158 (1.508)	-	-0.0153 (-1.150)	-0.0339** (-2.113)
B_SIZE	+	0.00786 (0.409)	0.0293** (2.073)	0.0372 (1.513)	-	-0.0586* (-1.908)	-0.0885** (-2.389)
B_MEET	+	-0.00648 (-0.658)	0.0106 (1.468)	0.00414 (0.329)	-	-0.0143 (-0.890)	-0.0253 (-1.307)
Industry year fixed effect		Yes	Yes	Yes		Yes	Yes
Observations		436	436	436		428	428
Adjusted R-squared		0.116	0.0703	0.0978		0.0622	0.0363
F test		4.439	3.154	3.902		1.562	2.269
Panel B: Treatment effect model							
Constant	+/-	0.257** (1.997)	-0.0163 (-0.152)	0.240 (1.325)	+/-	-0.168 (-0.813)	-0.136 (-0.517)
GOV_DUM	+/-	-0.0518 (-0.500)	0.165* (1.925)	0.113 (0.780)	+/-	-0.0540 (-0.337)	-0.211 (-1.035)
FAM_OWN	+/-	-0.0539 (-0.464)	0.0173 (0.191)	-0.0365 (-0.234)	+/-	0.169 (0.906)	0.170 (0.731)
(FAM_OWN) ²	+/-	0.0514 (0.311)	0.123 (0.952)	0.175 (0.785)	+/-	-0.289 (-1.073)	-0.444 (-1.324)
GOV_DUM*FAM_OWN	+/-	0.689*** (2.626)	-0.186 (-1.074)	0.503 (1.606)	+/-	-0.371 (-0.898)	-0.177 (-0.368)
GOV_DUM*(FAM_OWN)²	+/-	-0.742** (-2.087)	0.0622 (0.266)	-0.680 (-1.606)	+/-	0.531 (0.946)	0.474 (0.724)
SIZE	+/-	-0.0101 (-1.455)	-0.0157*** (-2.666)	-0.0258*** (-2.602)	+/-	0.0177 (1.595)	0.0335** (2.351)
ROA	+/-	0.510*** (5.416)	-0.0765 (-1.099)	0.433*** (3.567)	+/-	-0.278* (-1.771)	-0.185 (-0.967)
LEV	-	-0.0294 (-1.550)	-0.0218 (-1.518)	-0.0512** (-2.057)	+	0.0406 (1.346)	0.0652* (1.764)
GROWTH	+/-	-0.0170 (-1.154)	0.0262** (2.434)	0.00926 (0.491)	+/-	0.0227 (0.961)	-0.00514 (-0.180)
LOSS	-	0.0162 (1.036)	0.0174 (1.473)	0.0336 (1.640)	+	-0.00830 (-0.334)	-0.0254 (-0.835)
F_AGE	+	-8.77e-05 (-0.0100)	0.0238*** (3.763)	0.0237** (2.133)	-	-0.00335 (-0.234)	-0.0292* (-1.691)
AUD_FEE	+	-0.00368 (-0.505)	0.0135** (2.555)	0.00985 (1.061)	-	-0.00659 (-0.567)	-0.0213 (-1.522)
B_SIZE	+	-0.00646 (-0.358)	0.0257* (1.915)	0.0193 (0.823)	-	-0.0468 (-1.631)	-0.0743** (-2.128)
B_MEET	+	-0.00417	0.00886	0.00469	-	-0.0162	-0.0257

(continued on next page)

Table 9 (continued)

	Exp. sign	(1)	(2)	(3)	Exp. Sign	(4)	(5)
VARIABLES		AB_CFO	AB_DISC	REM_1		AB_PROD	REM_2
		(-0.442)	(1.302)	(0.392)		(-1.063)	(-1.396)
Selection model							
Constant		7.605 (0.714)	7.605 (0.714)	0.240 (1.325)		-0.168 (-0.813)	-0.136 (-0.517)
PUB_OW_N		2.305 (1.381)	2.305 (1.381)	2.305 (1.381)		2.162 (1.293)	2.162 (1.293)
(PUB_OW_N) ²		-2.695 (-1.286)	-2.695 (-1.286)	-2.695 (-1.286)		-2.606 (-1.239)	-2.606 (-1.239)
SIZE		-1.036 (-1.010)	-1.036 (-1.010)	-1.036 (-1.010)		-1.141 (-1.106)	-1.141 (-1.106)
(SIZE) ²		0.0295 (1.191)	0.0295 (1.191)	0.0295 (1.191)		0.0323 (1.294)	0.0323 (1.294)
Observations		436	436	436		428	428
Wald Chi ²		72.35	61.35	59.82		22.92	34.25

$REM = \beta_0 + \beta_1 GOV_DUM_{it} + \beta_2 FAM_OWN_{it} + \beta_3 (FAM_OWN_{it})^2 + \beta_4 GOV_DUM_{it} * FAM_OWN_{it} + \beta_5 GOV_DUM_{it} * (FAM_OWN_{it})^2 + \beta_6 SIZE_{it} + \beta_7 ROA_{it} + \beta_8 LEV_{it} + \beta_9 GROWTH_{it} + \beta_{10} LOSS_{it} + \beta_{11} F_AGE_{it} + \beta_{12} AUD_FEE_{it} + \beta_{13} B_SIZE_{it} + \beta_{14} B_MEET_{it} + \epsilon_{it}$, where, REMs is the proxies for AB_CFO, AB_DISC, REM_1, AB_PROD, and REM_2; GOV_DUM is a dummy variable coded with value of one if the composite governance score is equal to or greater than the industry median value, zero if otherwise; FAM_OW_N is the proportion of common stock owned by the family members; SIZE is the natural logarithm of total assets of the current period; ROA is the ratio of net income to total assets of the current period; LEV is the ratio of total debt to total assets of the current period; GROWTH is the sales growth rate for the current period; LOSS is a Dummy variable coded with value of one if the firm incurs loss during the previous period, zero if otherwise; F_AGE is the natural log of number of years since the firm is incorporated; AUD_FEE is the natural logarithm of current period's audit fee; B SIZE is the natural logarithm of the number of board members; B_MEET is the natural logarithm of the number of board meetings; PUB_OW_N is the proportion of equity ownership held by general investors. Superscripts***, **, * represent significance level at 1%, 5% and 10%, respectively. t or z-statistics are in parentheses.

is the weak governance firm and the coefficient of the squared family ownership indicates the relationship between REMs and family ownership for these firms.

Panel A of Table 9 demonstrates the regression outcomes of Model 2 with industry year fixed effect. Our H2a is supported for three REMs measures. The interaction term $GOV_DUM * (FAM_OWN)^2$ is not significant when REMs is proxied by AB_DISC, AB_PROD, and REM_2. This provides support to our hypothesis that there is no significant difference between strong governance and weak governance firms in the curvilinear relationship of family ownership and REMs during the pre-reform period. However, our hypothesis is not supported when AB_CFO and REM_1 are employed as REMs proxies.

Panel B of Table 9 exhibits the treatment effect model to address the endogeneity issue. The selection model for GOV_DUM is estimated on public equity ownership, square of public equity ownership, size, and square of size. The outcome model estimates are similar to that of our fixed effect estimates. Except for AB_CFO, all other REMs proxies support our hypothesis (H2a) that the curvilinear relationship between REMs and family ownership is not a function of corporate governance.

4.9. Corporate governance and the curvilinear relationship between REMs and family ownership during post-reform period

We posit that the curvilinear relationship between family ownership and REMs varies significantly from strong governance firms to weak governance firms in Bangladesh during the post-reform period. We estimate Model 2 on the post-reform period 2012 to 2016. Panel A of Table 10 reports the industry year fixed effect regression outcomes. Our hypothesis of significant difference between strong and weak governance firms with regard to curvilinear relationship of family ownership and REMs is supported for all the proxies except AB_CFO.

Panel B of Table 10 shows the treatment effect estimates. The results are similar to that of Panel A that strong governance firms' curvilinear relationship of family ownership and REMs are significantly different than that of weak governance firms in the post-reform period. We show that during the post-reform period, firm's governance structure has strong moderating impact on the relationship of family ownership and REMs.

5. Conclusion

We examine the effectiveness of independent directors in restricting REMs in family and non-family firms around a corporate governance reform in Bangladesh. Although the results indicate that board independence is effective in mitigating several modes of REMs in non-family firms, there is no such evidence of independent boards' effectiveness in family firms under the less stringent governance regime during 2006 to 2011 in Bangladesh. However, after the corporate governance reform in 2012, we find that the effectiveness of board independence in family firms in lowering the magnitude of REMs has improved significantly. A number of alternative tests suggest that our results are relatively robust to potential endogeneity concerns.

Table 10
Corporate governance and curvilinear relationship in post-reform period.

VARIABLES	Exp. sign	(1)	(2)	(3)	Exp. Sign	(4)	(5)
		AB_CFO	AB_DISC	REM_1		AB_PROD	REM_2
Panel A: Fixed effect model							
Constant	+/-	0.127* (1.681)	-0.0125 (-0.175)	0.114 (1.048)	+/-	-0.00762 (-0.0666)	0.00486 (0.0319)
GOV_DUM	+/-	-0.0443 (-1.289)	-0.0875*** (-2.687)	-0.132*** (-2.651)	+/-	0.0553 (1.057)	0.143** (2.051)
FAM_OWN	+/-	-0.0678 (-0.387)	-0.668*** (-4.029)	-0.736*** (-2.905)	+/-	0.420 (1.578)	1.089*** (3.070)
(FAM_OWN) ²	+/-	-0.103 (-0.411)	1.158*** (4.890)	1.055*** (2.917)	+/-	-0.731* (-1.922)	-1.888*** (-3.732)
GOV_DUM*FAM_OWN	+/-	0.0935 (0.458)	0.861*** (4.458)	0.955*** (3.235)	+/-	-0.754** (-2.429)	-1.615*** (-3.910)
GOV_DUM*(FAM_OWN)²	+/-	0.0634 (0.226)	-1.378*** (-5.188)	-1.315*** (-3.240)	+/-	1.400*** (3.281)	2.778*** (4.891)
SIZE	+/-	-0.00533 (-1.323)	-0.0181*** (-4.757)	-0.0235*** (-4.029)	+/-	0.00627 (1.024)	0.0244*** (2.995)
ROA	+/-	0.343*** (3.396)	-0.0238 (-0.249)	0.319** (2.186)	+/-	-0.0485 (-0.316)	-0.0247 (-0.121)
LEV	-	-0.0360** (-2.125)	-0.0449*** (-2.796)	-0.0809*** (-3.300)	+	0.0528** (2.049)	0.0977*** (2.847)
GROWTH	+/-	-0.0152 (-1.005)	0.0558*** (3.898)	0.0406* (1.857)	+/-	0.00177 (0.0769)	-0.0540* (-1.766)
LOSS	-	0.00476 (0.345)	0.00804 (0.617)	0.0128 (0.642)	+	0.00706 (0.337)	-0.000977 (-0.0351)
F_AGE	+	-0.0130 (-1.373)	0.00936 (1.048)	-0.00361 (-0.264)	-	-0.00960 (-0.669)	-0.0190 (-0.993)
AUD_FEE	+	0.00268 (0.428)	0.0255*** (4.303)	0.0282*** (3.113)	-	-0.00979 (-1.027)	-0.0353*** (-2.785)
B_SIZE	+	0.0190 (1.211)	0.0496*** (3.335)	0.0687*** (3.020)	-	-0.0438* (-1.833)	-0.0935*** (-2.937)
B_MEET	+	0.00450 (0.443)	0.0253*** (2.631)	0.0298** (2.029)	-	0.0173 (1.121)	-0.00800 (-0.389)
Industry year fixed effect		Yes	Yes	Yes		Yes	Yes
Observations		397	397	397		397	397
Adjusted R-squared		0.0616	0.155	0.112		0.0593	0.0999
F test		2.889	5.494	4.209		2.832	3.887
Panel B: Treatment effect model							
Constant	+/-	-0.00617 (-0.0461)	-0.0723 (-0.817)	-0.0785 (-0.427)	+/-	0.0751 (0.502)	0.147 (0.731)
GOV_DUM	+/-	-0.319** (-2.143)	-0.163 (-1.545)	-0.482** (-2.359)	+/-	0.277 (1.611)	0.440* (1.914)
FAM_OWN	+/-	-0.181 (-0.961)	-0.571*** (-3.614)	-0.751*** (-2.913)	+/-	0.566** (2.386)	1.137*** (3.654)
(FAM_OWN) ²	+/-	0.0459 (0.165)	1.058*** (4.610)	1.104*** (2.884)	+/-	-0.912*** (-2.620)	-1.970*** (-4.306)
GOV_DUM*FAM_OWN	+/-	0.236 (1.078)	0.836*** (4.611)	1.072*** (3.573)	+/-	-0.939*** (-3.427)	-1.776*** (-4.934)
GOV_DUM*(FAM_OWN)²	+/-	-0.142 (-0.465)	-1.393*** (-5.499)	-1.536*** (-3.649)	+/-	1.621*** (4.227)	3.014*** (5.983)
SIZE	+/-	0.0114 (1.065)	-0.00620 (-0.831)	0.00516 (0.353)	+/-	-0.00242 (-0.198)	0.00377 (0.230)
ROA	+/-	0.321*** (2.861)	-0.0355 (-0.425)	0.285* (1.854)	+/-	-0.122 (-0.920)	-0.0867 (-0.491)
LEV	-	-0.0321 (-1.560)	-0.0376** (-2.418)	-0.0697** (-2.467)	+	0.0468* (1.908)	0.0844*** (2.591)
GROWTH	+/-	-0.0158 (-0.853)	0.0544*** (3.860)	0.0387 (1.525)	+/-	0.0118 (0.534)	-0.0426 (-1.451)
LOSS	-	0.0181 (1.089)	0.00761 (0.581)	0.0257 (1.127)	+	-0.0210 (-1.039)	-0.0286 (-1.071)
F_AGE	+	-0.00828 (-0.733)	0.0111 (1.361)	0.00284 (0.183)	-	-0.00567 (-0.430)	-0.0168 (-0.955)
AUD_FEE	+	0.000316 (0.0440)	0.0135** (2.509)	0.0138 (1.399)	-	-0.0136 (-1.602)	-0.0271** (-2.396)
B_SIZE	+	0.0127 (0.657)	0.0457*** (3.139)	0.0583** (2.205)	-	-0.0469** (-2.041)	-0.0926*** (-3.036)

(continued on next page)

Table 10 (continued)

VARIABLES	Exp. sign	(1)	(2)	(3)	Exp. Sign	(4)	(5)
		AB_CFO	AB_DISC	REM_1		AB_PROD	REM_2
B_MEET	+	0.0111 (0.885)	0.0177* (1.953)	0.0289* (1.669)	–	0.00552 (0.376)	–0.0122 (–0.623)
Selection model							
Constant		–9.371 (–0.883)	–9.371 (–0.883)	–9.371 (–0.883)		–9.371 (–0.883)	–9.371 (–0.883)
PUB_OW_N		–0.954 (–0.464)	–0.954 (–0.464)	–0.954 (–0.464)		–0.954 (–0.464)	–0.954 (–0.464)
(PUB_OW_N) ²		1.077 (0.453)	1.077 (0.453)	1.077 (0.453)		1.077 (0.453)	1.077 (0.453)
SIZE		0.751 (0.744)	0.751 (0.744)	0.751 (0.744)		0.751 (0.744)	0.751 (0.744)
(SIZE) ²		–0.0123 (–0.512)	–0.0123 (–0.512)	–0.0123 (–0.512)		–0.0123 (–0.512)	–0.0123 (–0.512)
Observations		390	390	390		390	390
Wald Chi ²		37.53	82.93	46.71		51.19	74.54

$REM = \beta_0 + \beta_1 GOV_DUM_{it} + \beta_2 FAM_OWN_{it} + \beta_3 (FAM_OWN_{it})^2 + \beta_4 GOV_DUM_{it} * FAM_OWN_{it} + \beta_5 GOV_DUM_{it} * (FAM_OWN_{it})^2 + \beta_6 SIZE_{it} + \beta_7 ROA_{it} + \beta_8 LEV_{it} + \beta_9 GROWTH_{it} + \beta_{10} LOSS_{it} + \beta_{11} F_AGE_{it} + \beta_{12} AUD_FEE_{it} + \beta_{13} B_SIZE_{it} + \beta_{14} B_MEET_{it} + \varepsilon_{it}$, where, REMs is the proxies for AB_CFO, AB_DISC, REM_1, AB_PROD, and REM_2; GOV_DUM is a dummy variable coded with value of one if the composite governance score is equal to or greater than the industry median value, zero if otherwise; FAM_OW_N is the proportion of common stock owned by the family members; SIZE is the natural logarithm of total assets of the current period; ROA is the ratio of net income to total assets of the current period; LEV is the ratio of total debt to total assets of the current period; GROWTH is the sales growth rate for the current period; LOSS is a Dummy variable coded with value of one if the firm incurs loss during the previous period, zero if otherwise; F_AGE is the natural log of number of years since the firm is incorporated; AUD_FEE is the natural logarithm of current period's audit fee; B_SIZE is the natural logarithm of the number of board members; B_MEET is the natural logarithm of the number of board meetings; PUB_OW_N is the proportion of equity ownership held by general investors. Superscripts***, ***, * represent significance level at 1%, 5% and 10%, respectively. t or z-statistics are in parentheses.

We also find curvilinear relationships between family ownership and REMs but only for firms with stronger governance and only during the stricter post-reform governance period. There is no curvilinear relationship between REMs and family ownership in the case of weak governance firms. This implies that the alignment of interest effect improves with the increase in the family ownership for strong governance firms. Relatively weaker governance firms do not benefit from the alignment of interest effect with the increase in the ownership concentration. Instead, they appear to suffer from greater magnitude of the entrenchment effect at higher levels of family ownership. We do not observe such a difference in the ownership-REM relationship between firms with strong and weak governance in the less stringent pre-reform governance period.

The nuanced impact of corporate governance in restricting REM as well as the impact of regulation extends the literature in respect of family firms in emerging economies and may be generalised to similar domains with institutional weaknesses and weak investor protection. The evidence supporting the efficacy of the more stringent post-reform corporate governance regime has public policy implications and should also be of interest to regulators.

Declaration of Competing Interest

None.

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