Strategic Alliances and Earnings Management

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Abstract

In this paper, we examine the relationship between strategic alliances and earnings management. Utilizing a difference-in-differences analysis based on matched pairs, we find that allied firms experience a significant 9% reduction in earnings management. This reduction is attributed to enhanced governance monitoring and increased reputation capital resulting from strategic alliances. Our additional analyses reveal that the effect is more pronounced when alliances involve partners from different industries, when the partner in the alliance is larger, and when firms build alliance networks with multiple entities. In sum, our findings support the notion that strategic alliances improve corporate governance and mitigate agency problems, thereby contributing to the integrity of financial reporting.

JEL classification: L14, G32, G34, M41

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1. Introduction

Strategic alliances have become ubiquitous across industries, with over 90% of CEOs considering partnerships to be crucial for corporate strategy and growth (KPMG, 2018). They become an essential tool for firms seeking to access capabilities and assets amid rapid market changes. However, prior research provides competing perspectives on how these collaborative agreements may impact financial reporting behaviors. On the one hand, alliances enhance corporate governance through partner monitoring and certification benefits (Robinson, 2008; Nicholson et al., 2005). This could restrict opportunistic earnings manipulation. Alternatively, blurred firm boundaries from alliances may facilitate obscuring such activities while reducing scrutiny (Hirshleifer and Teoh, 2003). Empirical evidence able to reconcile these viewpoints is lacking.

Earnings management represents a key facet of financial reporting quality warranting greater attention as strategic alliance prevalence grows. Agency theory posits managers have incentives to manipulate earnings to maximize private benefits, hiding true performance from shareholders (Jensen and Meckling, 1976; Demesetz and Lehn, 1985; Leuz et al., 2003). Strategic alliances may ameliorate or exacerbate such agency conflicts. This study helps fill a void in the literature by investigating if and how strategic alliances affect corporate earnings management.

Prior studies have depicted strategic alliances as channels through which firms communicate, exchange resources, form new relationships, and leverage existing ones (Barney, 1986; Berg and Friedman, 1981; Wernerfelt, 1984; Borgatti and Foster, 2003; Anand and Khanna, 2000; Dessein, 2005; Robinson and Stuart, 2007). In recent years, research has expanded to explore how strategic alliances can exert a significant influence on aspects such as corporate investment, governance, and value creation (Chan et al., 1997; Allen and Phillips, 2000; Bodnaruk et al., 2013; Huang et al., 2019). A study closely related to the present work

by Demirkan and Demirkan (2014) argues that the blurring boundaries between contractually allied firms lead to a distortion in disclosure information. This distortion subsequently affects financial reporting quality detrimentally and gives rise to agency conflicts between managers and shareholders.

In our research, we explore a similar issue relating strategic alliances to a firm's earnings management practices. Our approach differs from that of Demirkan and Demirkan (2014) as they focus their analysis on a comparison between allied and non-allied firms, rather than an examination of how firm behavior evolves upon engaging in alliances. We employ a difference-in-differences (DiD) design to examine alliance deals announced in U.S. listed firms from 2005-2014 and examine their behavior five years before and after the alliance announcements (i.e., between 2000 and 2019). We construct a matched sample that consists of alliance firms and their matched control firms that share similar characteristics. We then analyze how the earnings management of allied (treated) firms changes after a strategic alliance year relative to that of control firms. We find that strategic alliances are associated with lower earnings management. Economically, depending on the proxies for accrual-based earnings management used, we find that firms, on average, experience a decrease in earnings management of approximately 9% following strategic alliances.

To validate our DiD estimate, we conduct two tests. First, we examine the dynamic effect of strategic alliances and find that the reduction in earnings management is evident only after the alliance is formed. Second, we conduct falsification tests and find no changes in earnings management following pseudo-alliances during the pre- or post-alliance period.

We then explore two plausible mechanisms through which strategic alliances lead to lower earnings management. First, we use management entrenchment to capture governance monitoring, and we find that allied firms experience a reduction in management entrenchment (i.e., an increase in governance monitoring) in the post-alliance periods relative to non-allied

firms. We also show that firms with the improvement in governance monitoring have a greater reduction in earnings management. Second, we find that the reputation capital of allied firms increases after strategic alliances, and those firms with a greater increase in reputation capital exhibit a larger decrease in earnings management. These findings suggest that the disciplinary and certification signal mechanisms can result in a significant decrease in earnings management.

We also investigate several cross-sectional variations in the effect of strategic alliances on earnings management. As allied firms may better understand the accounting report provided by industry peers, the incremental effect by alliance partners should be lower. Consistent with our argument, we show that earnings management to decrease to a larger extent with alliances in which both partners operate in the different industry. Further, the relation between strategic alliances and earnings management could vary with the relative size of partner firms and firm's alliance network centrality. We find more pronounced results when the partner to the alliance is larger. We also find the relation between strategic alliances and earnings management is more pronounced among well-connected firms, capturing using the number of direct connections to other firms in the network.

We next conduct two additional analyses to further explore the role of strategic alliances in earnings management. First, we use gravity models to assess the extent of similarity in earnings management among allied firms. We find that allied firms have higher levels of similarities in earnings management than non-allied firms, reinforcing our baseline results and suggesting that strategic alliances facilitate lower earnings management. Second, we investigate the effect of strategic alliances and real earnings management and find that the negative effect of strategic alliances is achieved through cutting discretionary expenses and product manipulation.

For robustness, we perform two tests as follows. First, we replace alliance fixed effects with firm fixed effects. Second, we include confounding networks as additional controls: board networks formed from interlock directors and firms sharing common auditors. In both tests, we find that results still hold qualitatively, reinforcing our main findings.

We contribute to the limited evidence on strategic alliances in serval ways. It has been documented that strategic alliances do create shareholder returns, improve corporate governance, and reduce borrowing cost on average (e.g., McConnell and Nantell, 1985; Chan et al., 1997; Robinson, 2008; Fang et al., 2012; Bodnaruk et al., 2013). Extending this line of literature, we empirically address the important questions of whether and how strategic alliances affect earnings management. Due to the possible identification challenges, prior study often provides the basic evidence on the effect of strategic alliances on earnings quality (Demirkan and Demirkan, 2014). By using difference-in-differences analysis, our findings provide the contrasting evidence on the effect of strategic alliances: Strategic alliances reduce earnings management.

Second, we also contribute to the literature on the value created by strategic alliances. Prior research shows that strategic alliances create value for the involved firms because alliances can increase knowledge sharing, improve operating efficiency, diversify risk, mitigate financial constraints, and allow for cooperation in product markets and technology development (Chan et al., 1997; Allen and Phillips, 2000; Anand and Khanna, 2000; Gomes-Casseres et al., 2006, Beshears, 2013 and Li et al., 2019). In contrast, our results provide evidence of specific channels through which firms can benefit from these strategic partner agreements: strategic alliance partners can benefit from a certification and monitoring effect from their strategic alliance partners. Importantly, we show that strategic alliances affect management and governance practices through reputation and disciplinary channels, which can be reflected in lower earnings management. Our paper thus offers novel insights into the role

of strategic alliances as a predictor of earnings management, and also addresses the call for further research on how strategic alliances affect accounting reporting from Demirkan and Demirkan (2014).

Lastly, this paper has both academic and practical implications. From the academic perspective, given the significance impact of strategic alliances on earnings management, we suggest that future studies on earnings management should consider strategic alliances as a standard control. From the practical perspective, evidence from this paper can help U.S. regulators and investors better understand the firms' financial reporting behaviors in light of strategic alliances.

The remainder of this paper is organized as follows. In Section 2, we review the literature and form our testable hypotheses. In Section 3, we describe our data, variables, and methodologies. In Section 4, we report our empirical results. We then conclude our paper in Section 5.

2. Background and Hypothesis Development

2.1 Background

Strategic alliance occurs when allying firms enter a collaborative agreement to achieve common objectives (Gulati and Singh, 1998; Baker et al., 2002). In the United States, alliance arrangements have grown increasingly common, and the number of alliances has surpassed that of mergers and acquisitions (M&As) (Bodnaruk et al., 2013). Strategic alliances embrace a wide range of organizational forms including joint ventures, R&D agreements, sales and marketing agreements, manufacturing agreements, supply agreements, and licensing and distribution agreements. Given the high prevalence of strategic alliances, it is not surprising that they constitute credible channels for interaction between firms (Doz and Hamel, 1998).

The original studies examining strategic alliances are based on the resources dependence theory, which is used to explain why connections exist between firms in established networks (Barney, 1986; Wernerfelt, 1984). Wernerfelt (1984) states that when firms form strategic alliances, it is expected that these alliances provide resources that help the firms with financial structuring and long-term development. He further explains that alliances offer various benefits to organizations, including specialized knowledge or expertise, access to new markets or distribution channels, technological capabilities, unique products or services, complementary resources or capabilities, and creating important communication channels between organizations.

Resources dependence theory views strategic alliances as mechanisms for managing external resources, which help to reduce uncertainty and lower transaction cost (Oxley, 1997). Therefore, from the point of view of this theory, strategic alliances act as connections between firms and corporate environment, minimizing the uncertainty of contingency factors (Borgatti and Foster, 2003). It also highlights the importance of inter-organizational connections and collaborations in achieving sustainable competitive advantage (Wernerfelt, 1984). Consequently, establishing the connections between firms through strategic alliances facilitates access to external resources, as they tend to work towards common objectives.

Given all the potential benefits, a substantial body research has documented the effects of these cooperative activities on value creation. Chan et al. (1997) find the positive shareholder wealth effects associated with strategic alliances announcements. Allen and Phillips (2000) document that strategic alliances lead to improvement in their profitability and operating performance. According to Ivanov and Lewis (2008), firms that establish strategic alliances prior to their Initial Public Offering (IPO) tend to achieve higher valuations, and experience faster growth compared to similar IPO firms that do not have alliances. Consistent with these

notions, strategic alliances can be regarded as a relatively low-cost approach to building new capabilities.

Another stream of research examines on investor reactions to other firm behavior and, hence, are about spillover of performance (e.g., Boone and Ivanov, 2012; Baxamusa et al., 2018). For instance, Boone and Ivanov (2012) show that strategic alliance partners suffer from negative stock return spillover effects when the firms files for bankruptcy. Fich et al. (2021) report significant negative stock return spillover effects of Securities Class Action lawsuit announcements to joint venture partners. On the other hand, firms benefit from collaborations through positive spillover effects. Baxamusa et al. (2018) find there are positive abnormal returns after a strategic alliance announcement when the partner's 10-K report is clearly written. This indicates that the transparency and quality of information provided in the partner's report can have a significant impact on investor perceptions and subsequent market outcomes. Moreover, Branstetter and Sakakibara (2002) document that knowledge and expertise gained from alliance activities can be applied effectively to non-alliance operations, resulting in profitable outcomes.

2.2 Hypothesis development

Based on the previous discussion, corporate actions are often embedded in the alliance network (Granovetter, 1985). Normally, strategic alliances are treated in a positive way, facilitating cohesion that may help increase the value of the firms in the long run (e.g., Berg and Friedman, 1981; Robinson and Stuart, 2007). Thus, good accounting and governance practices are reflected in firm performance, ultimately increasing market value and benefiting investors.

Recent literature (e.g., Bodnaruk et al., 2013; Robinson; 2008) views alliances as a form of commitment that can be utilized to reduce internal agency problems. When operational

activities are carried out in house, the managers have greater incentives to manage earnings for their own private benefit. Because strategic alliances are contracts between legally distinct organizations, they can help overcome investor uncertainty, effectively reducing earnings management through two main channels: disciplinary and certification channels.

The disciplinary channel arises from the increased monitoring and control exercised by alliance partners. Firms are required to evaluate the internal control practices of strategic partners under the Sarbanes-Oxley Act (SOX), leading to closer scrutiny of partner firms (Anderson et al., 2006). Alliance contracts may also contain financial-related and accounting-based provisions that directly impact the disciplinary function (Ge et al., 2021). Moreover, high-quality accounting practices enable management by investors, reducing agency frictions (Huang et al., 2022). Enhanced monitoring encourages firms to communicate more effectively through high-quality accounting information. Overall, this line of research supports the idea that monitoring leads alliance partners to detect and react to deviations from their own practices, reducing incentives and ability to engage in earnings management.

The certification channel stems from the signalling and certification roles of strategic alliance partners. In providing this function, strategic alliances serve as a reputational mechanism that mitigates managers' motivations to engage in earnings management. Prior research demonstrates that alliance partners are well-informed about each other's quality and value (Raub and Weesie, 1990) and benefit from their firms' reputations and prominence (Saxton, 1997; Stuart et al., 1999). As a result, firms may be less inclined to engage in opportunistic behaviour, fearing reputational damage and loss of position within their network. Das and Teng (2001) find that opportunistic behaviour is less likely within interactive groups, as their reputation can be easily tarnished. In today's interconnected world, news of manipulative financial practices can spread rapidly, potentially harming an alliance's reputation. Thus, the desire to maintain a strong reputation within the network can outweigh

managers' myopic incentive to manipulate earnings, leading to lower earnings management among allied firms.

Furthermore, alliances with strong reputations are more successful in attracting favourable deals within their networks. Nicholson et al. (2005) show that alliances serve as positive signals of asset and firm quality in the biotechnology industry. Consequently, reputation protection and sustainable presence may discourage opportunistic behaviour, leading to lower earnings management.

At the same time, there are countervailing arguments for why strategic alliances can increase earnings management. First, allied firms potentially face lower costs resulting from earnings management because the blurring boundaries of the firm can help cover up their activities or mitigate their negative consequences if those activities are revealed. Hirshleifer and Teoh (2003) and Peng and Xiong (2006) argue that investors fail to take into account the link between alliance partners. Prior literature finds substantial investor inattention in the case of strategic alliances. Cao et al. (2006) demonstrate the lagged response of a firm's return to that of its partners. Further, Kamminga and Van der Meer-Kooistra (2007) show that the inter-firm relationship between alliance partners increases the complexity in management control because they may have different expectations from the alliances. Thus, given that allied firms face less monitoring from their partners and investors, they are less afraid to engage in earnings management.

Second, allied firms have access to more information and resources to facilitate earnings management. For example, allied firms may keep their cash flows from operations lower to manage their earnings because they can obtain financial and non-financial help from their alliance networks when needed (Khan et al., 2022). Furthermore, firms may find it easier to implement certain earnings management techniques that may be difficult to observe publicly, such as timing sales and expenses involving friendly connections, or utilizing network sales

and deals (Demirkan and Demirkan, 2014; Sagal and Slowinski, 2016). Hence, allied firms possess more information and resources for managing earnings, and they face fewer negative consequences from earnings management.

Given these conflicting arguments, the relation between strategic alliances and earnings management is an empirical question. Accordingly, we formulate the following null hypothesis:

H0: There is no significant relationship between strategic alliances and earnings management.

3. Data and Methodology

3.1 Data

To construct our sample, we require the earnings management data, financial and accounting data, internal control data, and reputation data for five years before and after strategic alliance events for U.S. public firms from 2005 – 2014[2]. We use the firm-year observations starting from 2005, which also mitigates the potential bias that might arise from the implementation of SOX, in 2004[3]. To obtain data about companies' strategic alliances, we rely on data from the Securities Data Corporation (SDC) Platinum database. Financial and accounting data come from Compustat database. Figure 1 demonstrates the strategic alliances trend from 2005 to 2014.

3.2 Earnings Management Measures

Following prior studies (e.g., Owens et al., 2017; Dechow et al., 2010), we three different firm-specific earnings management in our main analysis. The first measure is the

[2] Following the lines of extant work, we limit the lifespan of alliance relationships to five years (e.g., Gulati and Gargiulo, 1999; Sytch and Tatarynowicz, 2014). The reason is that alliance durations are rarely disclosed.
[3] SOX enforced requirements regarding the effectiveness of internal controls over financial reporting (Section 404, SOX 2004) as well as the reliability of accounting reports of the affected firms (Iliev, 2010; Ge and Lennox; 2011)

Modified Jones model (Dechow et al., 1995), as modified by Jones (1991). While Jones (1991) defined accruals as function of sales growth and property, plant, and equipment (*PPE*), the modified Jones model is adjusted by the growth in credit sales, which are frequently manipulated (Dechow et al., 1995). Accordingly, we estimate the following model:

$$\frac{TA_{i,t}}{ASSET_{i,t-1}} = \alpha_1 \, x \, \left(\frac{1}{ASSET_{i,t-1}}\right) + \alpha_2 x \, \left[\frac{(\Delta REV_{i,t} - \Delta AR_{i,t})}{ASSET_{i,t-1}}\right] + \alpha_3 x \frac{PPE_{i,t}}{ASSET_{i,t-1}} + \epsilon_{i,t} \quad (1)$$

Where for fiscal year t and firm i, $TA_{i,t}$ represents total accruals defined as earnings before extradentary items and discontinued operations minus operating cash flows from continuing operations, $ASSET$ indicates total assets, ΔREV represents change in revenues from previous year, ΔAR is the change in accounts receivable from the previous year, and PPE indicates the gross value of property, plant, and equipment. We estimate Equation (1) by year and two-digit SIC industry, and compute the discretionary accruals by modified Jones model (*Accrual_MJ*) as the absolute value of the difference between total accruals (*TA*) deflated by lagged assets and the fitted values of Equation (1).

The second earnings management measure is performance model by Kothari et al. (2005). This model incorporates the effects of firm fundamentals, in particular, firm performance, into the estimate of normal accruals. Thus, we have:

$$\frac{TA_{i,t}}{ASSET_{i,t-1}} = \alpha_1 \, x \, \left(\frac{1}{ASSET_{i,t-1}}\right) + \alpha_2 x \, \frac{\Delta REV_{i,t}}{ASSET_{i,t-1}} + \alpha_3 x \frac{PPE_{i,t}}{ASSET_{i,t-1}} + \alpha_4 \, x \frac{ROA_{i,t}}{ASSET_{i,t-1}} + \epsilon_{i,t} \quad (2)$$

Where ROA is calculated as net income divided by average total assets, and all other variables are as previously defined. We denote the residual from Equation (2) as *Accrual_PF* to capture the unexpected portion of total accruals that deviate from economic transactions.

As recognised by Kothari et al. (2005), the success of their approach relies on the standard accrual model assumptions of firm stationarity and intra-industry homogeneity. Ball and Shivakumar (2006) introduce a nonlinear accrual model to allow asymmetric associations of accruals with gains relative to losses. Their accrual model explicitly accounts for one important aspect of firm performance –economic gains and losses. We estimate nonlinear model as follows:

$$\frac{TA_{i,t}}{ASSET_{i,t-1}} = \alpha_1 x \frac{\Delta REV_{i,t}}{ASSET_{i,t-1}} + \alpha_2 x \frac{PPE_{i,t}}{ASSET_{i,t-1}} + \alpha_3 x \frac{DCF_{i,t}}{ASSET_{i,t-1}} + \alpha_4 x \frac{DCF_{i,t} x CF_{i,t}}{ASSET_{i,t-1}} + \epsilon_{i,t} \quad (3)$$

Where *CF* is operating cash flows scaled by average total assets, *DCF* is an indicator that equals 1 if *CF* is < 0, and equals 0 otherwise, and all other variables are as defined above. We denote the residual from Equation (3) as *Accrual_NL.*

3.3 The construction of a matched sample

To evaluate whether strategic alliances affect firms' earnings management, we conduct a Difference-in-Difference (DiD) analysis. This analysis encompasses observations from five years before and after the formations of strategic alliances; the alliance announcement month is excluded. We focus our analysis on alliance deals with exactly two firms (this comprises about 94% of the overall alliance sample).

In the strategic alliances database, we identify a total of 451 strategic alliance events among U.S. public firms, covering 583 unique firms during the period from 2005 to 2014. Each treatment firm in these deals is matched to another firm based on TNIC[4] product similarity

[4] Hoberg and Phillips developed the Text-Based Network Industry Classification (TNIC) database. The construct this classification by analysing the firms' 10k business description and calculate a similarity score between every two firms each year. Firms with higher TNIC scores have more similar product descriptions and therefore closer peers.

score, size, leverage, return on assets (ROA). First, we match each treatment firm with peer firms in the TNIC database one year prior to the formation of the strategic alliance, and manually check the peer firms never suffer an alliance in that event year. We then obtain financial information, including size, leverage and ROA, for both the treatment firms and their peer firms in the TNIC, and choose the firm that is the closest similarity in the above four criterias. Thus, for each deal, we have a pair of real participants and two pairs of matched firms. This procedure results in a final sample of treatment firms (5812 firm-years) and matched control firms (5115 firm-years).

3.4 Summary Statistics

Table 1, Panel A presents descriptive statistics for the variables used in our main analysis. Despite the differences in sample periods, and economics, we find that the statistics are generally consistent with those reported by the earnings management literature (e.g., Owen et al., 2017; Dechow et al., 2010).

Panel B of Table 1 presents a univariate analysis of the effect of strategic alliances on crash risk. It shows that the means of the earnings management variable, *Accrual_MJ, Accrual_PF* and *Accrual_NL*, are 0.042, 0.041 and 0.040, respectively, in the pre-alliance period, but they decline to 0.040, 0.037 and 0.036 in the post-alliance period. The differences in the mean values of *Accrual_MJ, Accrual_PF* and *Accrual_NL* between two periods are -0.003, -0.004 and -0.004, respectively, all statistically significant at the 1% level. This result provides preliminary evidence suggesting that earnings management declines after strategic alliances.

Table 2 reports the Pearson correlation coefficients for all dependent and independent variables included in our main analysis. There is no pairwise correlation among independent variables exceeding 50%, indicating that multicollinearity is not an issue in this study.

4. Empirical Results

4.1 Baseline Regressions

To empirically test the effect of strategic alliances on firms' earnings management, we employ the following DiD regression analysis for the treated firms and matched control firms:

$$Earnings\ management_{i,t} = \alpha_0 + \alpha_1 Post_t\ x\ Treat_i + \gamma Control\ Variable_{i,t} + Pair\ FE_i + Year\ FE_t + \varepsilon_{i,t} \qquad (4)$$

In which the dependent variable, $Earnings\ management_{i,t}$ denotes our various measures of firm i's earnings management in year t (which we have discussed in Section 3.2). Our main variable of interest is the interaction term, $Post_t\ x\ Treat_i$. $Treat_i$ is an indicator that equals one if firm i is in the treatment group and zero in the control group. $Post_t$ is an indicator that equals one for the post-alliance period of the treatment firm (year t, year t+1, year t+2, year t+3, year t+4, year t+5), and zero for the pre-alliance period (year t-1, year t-2, year t-3, year t-4, year t-5), in which year t is the fiscal year in which a strategic alliance occurs. $Control\ Variable_{i,t}$ denotes a set of control factors that may influence a firm's earnings management, and they include *Size, Market to Book, Return on Asset, Leverage, Cash, Institutional Ownership, Loss, Research & Development; Managerial Ability, Merge, Issue, Z-score* (e.g., Chiu et al., 2013). These variables are defined in Appendix Table A1. We also include pair fixed effect and year dummies to control for firm-specific, time-invariant characteristics and time trends with respect to earnings management. We also use pair clustered standard errors for statistical inferences to correct the regression residuals that correlated across deals.

In Table 3, we present the DiD estimation result of Equation (4). Column (1) – (3) report the results using *Accrual_MJ, Accrual_PF, and Accrual_NL* as the measures of accrual-based earnings management, respectively. We find that the coefficients on $Post_t \; x \; Treat_i$ are negatively significant across all models, indicating that allied firms, compared to the matched control firms, exhibit a reduction in earnings management after the strategic alliance year. The effect of strategic alliances on earnings management is also economically significant. Based on the coefficients in columns (1), (2) and (3), firms on average experience a decrease in earnings management of 7.14%, 9.76% and 10.26% of their standard deviations[5], respectively, following the strategic alliances.

4.2 Dynamic Effect of Strategic Alliances and Falsification Tests

To verify the parallel assumption of the DiD method, we replace the *Post* indicator with nine-time dummies. Specifically, for the [-5, 5] sample, we construct the indicators *Before3*$^{-}$*, Before2, Before1*, which equal to one for three and four years, two years, and one year before the alliance formation, respectively. *Current, After1, After2* equal one for the formation year and one year and two years after the alliance formation year, respectively. *After 3*$^{+}$ equals one for three, four, and five years after the alliance formation year[6]. We regress earnings management on these dummies and the full set of controls as in Eq. (1). Table 4 Panel A shows that the coefficients on indicators before alliances formation are all indistinguishable from zero. These results imply that parallel trend assumption of our DiD approach is likely satisfied. The coefficient estimates of *Current* are insignificant. Importantly, we find significant and negative

[5] 7.14%=0.003/0.042, 9.76%=0.004/0.040, and 10.26%=0.004/0.039, where 0.003, 0.004, and 0.004 are the absolute value of the coefficients on *Post x Treat* in column (1) – (3) of Table 2, and 0.042, 0.04, 0.039 are the standard deviations of *Accrual_MJ, Accrual_PF, and Accrual_NL* in the pre-alliance period reported in Panel B of Table 1.

[6] We omit *Before5* in the regression to avoid the perfect multicollinearity problem and use that year as the reference group for the dynamic analysis.

coefficients on the post-formation indicators. Overall, the results suggest that the reduction of earnings management is driven by strategic alliances.

In addition, we conduct a falsification test to assess the validity of the parallel trends assumption in our DiD approach. This test helps us in answering whether in absence of treatment, the average change in the response variable would have been similar for the treatment and control group. We consider the period that precedes the true alliances [-5, 0]. We then set a pseudo-alliance formation year as 3 years prior to the true alliances, $False\ x\ Post$, which is equal to one starting from the pseudo-alliance formation year and zero otherwise. We use this variable in place of $False\ x\ Post$ in our baseline regression model. Since $False\ x\ Post$ indicates pseudo-events preceding in years of alliances formation, we should not observe significant results. We find that this is indeed the case as the coefficients on $False\ x\ Post$, as reported in Table 4 Panel B, are all insignificant.

4.4 Possible Mechanisms

In this section, we explore two possible channels through which strategic alliances can reduce earnings management: disciplinary and reputation channels. We find evidence that both channels work.

4.4.1 Disciplinary channel

There is a literature pointing that ex ante, the alliance contracting can serve as an effective corporate governance mechanism (Bodnaruk et al., 2013; Ge et al., 2021). Ex post, under the Sarbanes-Oxley Act (SOX), firms are required to assess the internal control practices of allied partners (Anderson et al., 2006). Good internal control disciplines managers. It urges them to engage in value-enhancing guards against opportunistic management behavior, potentially leading to lower earnings management.

We employ the *E-index* to capture internal control. Entrenched firms are associated with negative firm value and less forthcoming disclosure (e.g., Bebchuk et al. 2009; Irani and Oesch 2013). Firms with less entrenched managers are easier to trust to fully invest in the alliance arrangement or to corporate with their allied partner over time. Bebchuk et al. (2009) document that firms with greater values of the E-index are associated with more negative abnormal return. We report results in Table 5. In Panel A, after strategic alliances, the treatment group, on average, experiences a statistically significant decreases of 0.495 in E-index, suggesting that strategic alliances result in a decrease in their E-index compared with control firms.

In Panel B, we regress Δ*Earnings Management* on the change in E-index and the change of control variables for the sample. The change is from pre-alliance mean to post-alliance mean for each focal firm. The control variables are the same as used throughout the paper. The coefficient of the change in E-index is 0.003 in Column 1, indicating that, compared with the control firms, Treatment firms that experiences a large decrease in E-index surrounding the strategic alliances, on average, can lead to a further reduction of earnings management by 0.15% (0.003 x 0.495). Results for earnings management are similar in terms of sign and the magnitude of the effects. The results show that improved corporate internal governance is a channel through which strategic alliances affect firm's earnings management.

4.4.2 Certification channel

Another possible channel through strategic alliances reduce earnings management is reputation. Saxton (1997) and Stuart et al. (1999) argue that strategic alliances enhance allied firms' reputation and prominence. Alliances with strong reputations are more successful in attracting favourable deals within their networks. Nicholson et al. (2005) show that alliances serve as positive signals of asset and firm quality in the biotechnology industry. Consequently,

reputation protection and sustainable presence may discourage opportunistic behaviour, leading to lower earnings management.

We employ *Goodwill* to capture firm's reputation capital. In general, goodwill is the difference between a firm's current valuation and its net worth. A greater goodwill indicates firms with higher market or sales price (e.g., Fombrun, 1996; Clardy, 2005). Building and maintaining a greater reputation is thus to maintaining or increasing the value of the business in terms of its goodwill. We compute the sample mean of goodwill for each focal firm in the years before and after the alliances. Similar to the analysis in section 4.4.1, we report the result in Table 6. In Panel A, we show that compared with control firms, after strategic alliances, the treatment group, on average, experiences a statistically significant increase of 1.6% in goodwill.

In Panel B, we regress Δ*Earnings Management* on the change in goodwill and the change of control variables for the sample. We find that the change in goodwill is statistically significant and positive. An improvement in goodwill is associated with a decline in earnings management. For example, the coefficient on Δ*Goodwill* in Column (1) is -0.048. Firms in the treatment group that experience an increase of 0.016 in goodwill surrounding the strategic alliance event, on average, translates into a further reduction of *Accrual_MJ* by 0.08 % (0.048 x 0.016) compared with firms in the control group[7]. The magnitude is similar across the earnings management measures, but all suggest that the firms' goodwill is a channel through which strategic alliances affect firm's earnings management.

4.5 Cross-sectional analysis

4.5.1 Diversifying partnerships versus related partnerships

Our first test concerns the industries in which the partner firms operate. We examine whether the link between strategic alliances and earnings management is stronger when the

[7] Multiply the coefficient on ΔGoodwill by the difference-in-differences estimator of ΔGoodwill.

partner firm operates in an industry that differs from that of the partner. When a firm forms an alliance with a partner in the same industry, the difficult in understanding the partner's accounting behavior and the ensuring lack of credibility should matter less, because the allied firms understand the environment in which its partner operates. But when the alliance is with a partner from a different industry, partner's accounting behavior should matter more.

To test this notion, we divide the sample into related and diversifying partnerships based on the two-digit Standard Industrial Classification (SIC) codes of the participating firms. If pair firms have the same (different) two-digit SIC, then we consider it related (diversifying) partnerships. Panel A of Table 7 presents the results. We find the coefficient of interaction term are negatively significant when pair firms operate in a different industry, but insignificant for related pair firms. This finding suggests that partner firms in diversifying alliances aids in mitigating earnings management. The fact that our results are driven by partner firms in different industries and not by same industry partners indicates that the effect on earnings management from alliance partners are different from the effect by industry peers.

4.5.2 Relative size of partner firms

We next study whether the relation between strategic alliances and earnings management is stronger when firm is smaller than the partners. When the firm is smaller, its bargaining power within the alliance is likely to be smaller, which is likely to provide more accurate and detailed disclosure than when the firm is larger. Thus, we predict that the effect of strategic alliances on earnings management would be less pronounced when a firm has bargaining power.

To test for such effects, we divide the sample into high relative size and low relative size. We define a high relative size firm (*Relative Size =1*) as one whose market value is higher than that of pair firms. The results from the analysis are presented in Panel B of Table 7. We

find that both high and low relative size firms experience negative the earnings management effects, but they are stronger for the latter compared to the former. The fact that our results are stronger in this case suggests that the partners are more likely to effectively monitor and take an active role in the decision-making process of the firms. Such cross monitoring may decrease the abilities of the firm managers to behave opportunistically hence influence disclosure choices. Our evidence is thus consistent with the second channel.

4.5.3. Alliance networking analysis

We investigate whether strategic alliance networks of the firms affect their earnings management. Strategic alliances are formed by firms (nodes) and their connections (links). The position of the nodes in a network are not equal, and they gain power as they link to more firms. Such powerful positions are considered *central* in a strategic alliance network. Central firms face potentially higher costs resulting from earnings management because they may largely undermine their reputations if bad hoarding activities are revealed. Furthermore, central firms face intensive internal governance and more discipline from their alliance connections for corporate control. Thus, we expect that firms partner with multiple firms are more likely to reduce their earnings management.

Using the strategic alliance data, we use measure of centrality of *Degree Centrality* to assess a firm's position in the strategic alliance network. Following previous literature such as Kumar et al. (2022), our measure of centrality is *Degree Centrality*, which is the number of ties incident upon a node and hence it is a simple count of the number of ties a firm has in the network. That is, if L (i, j) indicates the linkage between nodes i and j for year t, the variable for firm i in the network is defined as follows:

$$Degree\ Centrality\ = \sum_{j\neq 1}^{t} \mathrm{L(i,j)}$$

All else equal, the more connections a firm has, the between-connected and more central it is in the network. We focus on *Degree Centrality* for the following reasons. First, *Degree Centrality* is the most direct way to measure a firm's connections and the most intuitive to interpret; that is it reveals the number of direct links that a firm has with other firms in alliance network. Second, *Degree Centrality* has enough variation among different firms over the sample period. We analyze based on treatment sample and estimate the following regression model:

$$Earnings\ management_{i,t} = \alpha_0 + \alpha_1 Post_t + \gamma Control\ Variable_{i,t} + Pair\ FE_i + Year\ FE_t + \varepsilon_{i,t}$$

Panel C, Table 7 reports the results of the sub-sample analysis of firms from one-link firms (*Degree Centrality* = 1) and many-link firms (*Degree Centrality* > 1). It shows that the coefficient of *Post* is strongly significant and lower in the subsample of firms belong to many-link firms, suggesting that the negative effect of strategic alliances on earnings management is more pronounced in the firms build up networks with many firms.

4.6 Additional Tests

4.6.1 Pair similarity in earnings management

We examine whether allied firms facilitate similar earnings management. If the relation is driven by strategic alliances, we expect that allied firms will show more similarity in their earnings management levels than matched control firms.

To test how similar the degree of earnings management is between two allied firms, we estimate a two-stage gravity model. Gravity models are used when outcomes are affected by the distance between objects, like gravity, and have been used in economics to explain bilateral trade flows between two countries in studies on international trade (e.g., Frankel and Romer, 1999). Following Fracassi (2017), who uses a gravity model to test the impact on the similarity

of corporate investment policies, we use a gravity model and adopt each pair of firms in the sample as the unit basis of analysis. Our gravity model is as follows:

$$\left|\Delta EM_{i,t}\right| = \alpha_0 + \alpha_1 Post_t \; x \; Treat_k + \gamma Control\; Variable_{i,t} + \gamma Control\; Variable_{l,t} + Pair\; FE + Year\; FE \quad (5)$$

The dependent variable is the pairwise difference (or similarity) in earnings management. If two firms have a similar level of earnings management, $\left|\Delta EM_{i,t}\right|$ will be smaller. For each pair, we measure $Treat_i$, which equals to one if pair firms form strategic alliances and zero otherwise. $Post_t$ equals to one for the post-alliance period of the treatment pair, and zero for the pre-alliance period. $Control\; Variable_{i,t}$ and $Control\; Variable_{l,t}$ represents the set of control variables of firms and their partners respectively. Because the residuals can be correlated across firm pairs, we report test statistics and significance levels based on the standard errors adjusted by two dimensional clusters at both firm levels (Petersen, 2008; Thompson, 2011).

In Table 8, we present the DiD estimation result of Equation (5). Consistent with our expectations, we find a negative, significant ($p < 0.01$) relation between strategic alliances and difference in accrual-based earnings management between two firms, indicating that allied firm pairs have more similarities in their discretionary accruals.

4.6.2 Strategic alliances and real earnings management

We further examine whether strategic alliances affect real earnings management strategies. Following Roychowdhury (2006), we use the following two proxies for real earnings management. The first measure is abnormal levels of production costs (*RM_PROD*), which occur through overproduction of inventory, resulting in a lower fixed cost per unit sold and a

reduction of cost of goods sold. The second measure is abnormal levels of discretionary expenses (*RM_DISX*), which is generated as a result of cutting discretionary expenses such as advertising, research and development, and administrative (*SG&A*) expenses.

Consistent with Cohen and Zarowin, (2010); Zang, (2012), we add the standardized variable of abnormal discretionary expenses (*RM_DISX*) multiplied by negative one to the standardized variable of abnormal production costs (*RM_PROD*). The higher the amount of this aggregate measure (*RM_PD)*, the more likely the firm is engaged in cutting discretionary expenses and product manipulation. In Table 9, we find that *Treat x Post* remains negative and significant, indicating that the impact of strategic alliances on real earnings management is achieved through cutting discretionary expenses and product manipulation.

4.7 Robustness Tests

4.7.1 Alternative fixed effects

Our baseline results could also be driven by any time-invariant unobservable firm characteristics that are correlated with the strategic alliances. To address this concern, we used pair fixed effects in our main regressions. However, an alternative is to use firm-level fixed effects. We re-estimate the baseline regression model with firm fixed effects with the results in Table 10 Panel A showing that the effect of strategic alliances on earnings management still remains, suggesting that our results are unlikely to be driven by time-invariant unobservable firm factors.

4.7.2 Controlling for alternative networks: Board Interlock and Common Auditor

We discuss additional tests to control for other types of networks. First, we include Interlock as another control in the model. This concern arises because Chiu et al. (2013) find that earnings restatements are contagious among firms with shared directors. To rule out the possibility that our result is driven by interlocked directors instead of strategic alliances, we

include *Interlock*, which is the total number of board connections a firm has to other firms in the network, as an additional control variable in the model. In addition, firms having the same auditor might also affect earnings management behaviour, *Shared Auditor,* which equals 1 if the same auditor audits the two pair firms that year and 0 otherwise.

We re-estimate the baseline regression model and present the results in Table 10 Panel B. Column (1) - Column (3) report the results including *Board Interlock.* It shows that *Board Interlock* are significant. Column (4) - Column (6) report the results including *Shared Auditor.* Overall, the coefficient on $Post_t \; x \; Treat_i$ remains negative and strongly significant, implying that our baseline results on the effects of the strategic alliances on earnings management are unlikely to be driven by board interlocking and common auditor.

5. Conclusion

We examine whether and how strategic alliances affect earnings management. Using a DiD estimation approach, we find that earnings management significantly decreases following strategic alliances. This result survives parallel trend and falsification tests. We provide mechanism tests to show that strategic alliances reduce earnings management through disciplinary and certification mechanisms. We also find stronger effect for alliance with partner firms in different industries and larger partner firms, and for firms with large alliance networks.

Collectively, our findings suggest that strategic alliances are important determinants of earnings management, both accrual and real activity-based. We contribute by showing the important role that strategic alliances play in facilitating the monitoring and certification effectiveness of their strategic alliance partners.

Overall, we advance research at the interplay of the alliance networks and corporate earnings management literature, and we believe that evidence in our paper can help investors and regulators better understand firms' financial behaviors in the context of strategic alliances.

However, we need to point out that our findings are based on a sample of U.S. firms. The strategic alliances could be fundamentally different among different countries, and our findings may not remain for other countries. Readers should be cautious about the generalizations and implications of our paper for other countries.

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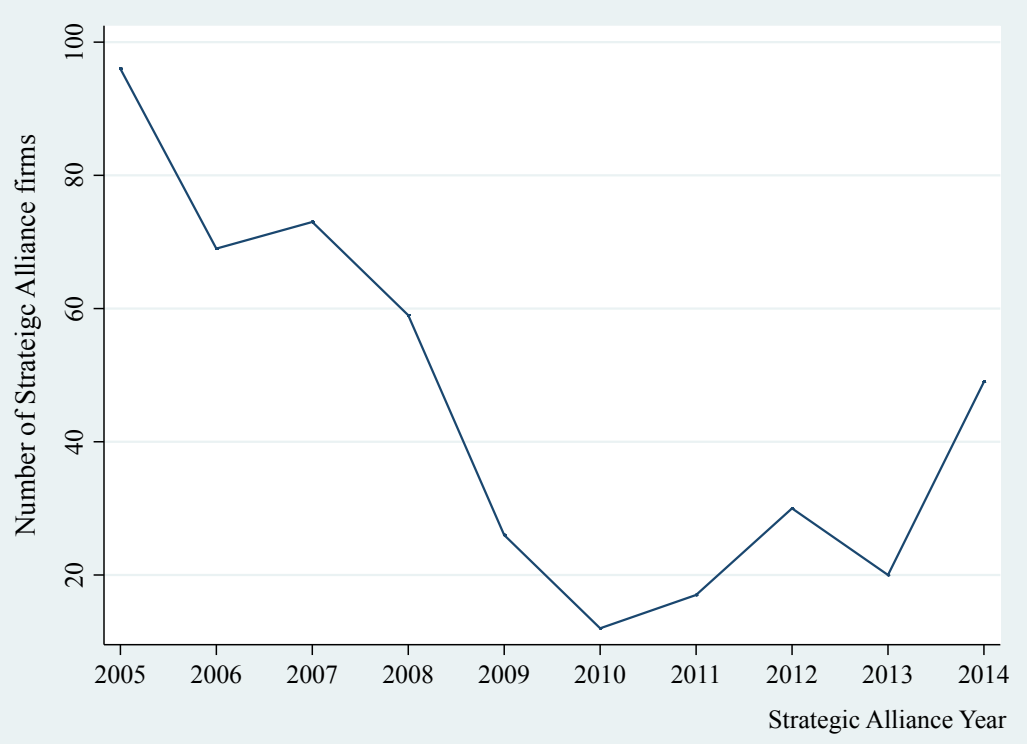
Appendix A: Variable Definitions

Variable Name	Variable Description
Main variables	
Accrual_MJ	Firm i's year t abnormal accrual, estimated as the residual from the estimation of the Modified Jones model (Dechow et al., 1995)
Accrual_PF	Firm i's year t abnormal accrual, estimated as the residual from the estimation of the accrual model with ROA performance control (Kothari et al., 2005) by industry-year
Accrual_NL	Firm i's year t abnormal accrual, estimated as the residual from the estimation of the nonlinear model (Ball and Shivakumar, 2006) by industry-year
RM_PD	Firm i's year t real activities' manipulation, computed as the sum of the standardized variable of RM_PROD and the standardized variables of RM_DISX multiplied by negative one (Cohen and Zarowin, 2010; Zang, 2012)
Treat	An indicator that equals 1 for firms in the treatment group, and 0 for firms in the control groups.
Post	An indicator that equals 1 for the post-alliance period of the treatment firms (year t, year t+1, year t+2, year t+3, year t+4, year t+5) and 0 for pre-alliance period (year t-1, year t-2, year t-3, year t-4, year t-5), win which year t is the fiscal year in which a strategic alliance occurs
Firm Controls	
BIG4	Indicator variable that equals 1 if firm is audited by a big 4 auditor and 0 otherwise.
Cash	Firms' cash and marketable securities (CHE) divided by assets (AT)
Degree Centrality	The total number of alliance connections a firm has to other firms in firm's alliance network.
E-index	Entrenchment index following Bebchuk et al. (2008). The index has a value from 0 to 6, with one point awarded for the presence of each of the following six provisions: staggered board, limits to amending bylaws, limits to amending charter, supermajority, golden parachutes, and poison pills.
Goodwill	Goodwill (GDWL) over assets (AT)
IO	Firms' percentage of common stock owned by institutions
Leverage	Firms' debt in current liabilities plus long-term debt (DLC+DLTT) divided by assets (AT)
Interlock	The total number of board connections a firm has to other firms in the network
Issue	Equals 1 if the sum of new long-term debt (DLTIS) and new equity (SSTK) is greater than 2 percent of total assets (AT)
MA	Managers' efficiency in generating revenues measured according to Demerjian et al. (2012)
MB	Firms' market to book ratio (PRCC_F* CSHO / CEQ)
Merge	Equals 1 if the firm has a M&A event (AQS) >0 in the year, and 0 otherwise
R&D	R&D expense (RD)over assets (AT)
Relative Size	Indicator variable that equals 1 if market value of firm (PRCC_F* CSHO) is greater than its pair and 0 otherwise.
Share Auditor	An indicator variable equals 1 when two pair firms are audited by the same auditors, and 0 otherwise
Size	Natural log of the firms' market value of common equity (PRCC_C*CSHO)
Z-Score	Modified Altman's (1968) Z-score (Graham, Li, and Qiu, 2008). Z-score=(1.2WCAP+1.4RE+3.3PI+0.999SALE)/AT, where WCAP is working capital, RE is retained earnings, and PI is pretax income, SALE is total sales, and AT is total assets. We use this modified Z-Score, which does not include the ratio of market value of equity to book value of total debt, because a similar term, market-to-book (M/B), enters our baseline regressions as a separate control variable.

Figure 1 Number of U.S. Public Firms by Sorted Year



This figure plots strategic alliance formations on an annual basis from 2005 to 2014.
Source: SDC Platinum Database

Table 1

Panel A: Summary Statistics

	N	Mean	Std. Dev.	min	p25	Median	p75	max
Accrual_MJ	10927	0.042	0.042	0	0.010	0.028	0.059	0.153
Accrual_PF	10948	0.040	0.040	0	0.009	0.027	0.057	0.147
Accrual_NL	10948	0.039	0.039	0	0.010	0.025	0.057	0.142
RM_PD	9528	0.129	0.130	0	0.034	0.090	0.178	0.590
Size	10948	8.144	2.293	4.079	6.360	8.134	9.911	11.978
Market to Book	10948	3.514	2.512	0.780	1.688	2.749	4.488	10.351
Leverage	10948	0.164	0.153	0	0.006	0.146	0.268	0.5
Cash	10948	0.259	0.212	0.012	0.076	0.207	0.403	0.711
IO	10948	0.659	0.232	0.135	0.526	0.700	0.840	0.977
R&D	10948	0.076	0.078	0	0	0.059	0.116	0.269
BIG4	10948	0.904	0.295	0	1	1	1	1
MA	10948	0.082	0.178	-0.134	-0.041	0.016	0.162	0.506
Merge	10948	0.557	0.497	0	0	1	1	1
Issue	10948	0.233	0.423	0	0	0	0	1
Z-score	10948	1.061	1.838	-4.176	0.573	1.479	2.208	3.441

Panel B: Univariate analysis of earnings management before and after strategic alliances

Variable	Period	Observations	Mean	Std. Dev.
	Pre-alliance	8538	0.042	0.042
Accrual_MJ	Post-alliance	2389	0.040	0.040
	Diff		-0.002***	
	t-stat.		-3.21	
	Pre-alliance	8555	0.041	0.041
Accrual_PF	Post-alliance	2393	0.037	0.039
	Diff		-0.004***	
	t-stat.		-4.96	
	Pre-alliance	8555	0.040	0.039
Accrual_NL	Post-alliance	2393	0.036	0.038
	Diff		-0.004***	
	t-stat.		-4.96	

The table presents the summary statistics and correlation coefficients of the variables used for the [-5, 5] sample. Panel A reports summary statistics. Panel B presents the univariate analysis of earnings management in the pre- and post-strategic alliance periods. All variables are provided in Appendix A. ***, ** and * indicate the 1%, 5%, and 10% significance levels, respectively.

Table 2 Pearson correlation

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(1) Accrual_MJ	1.000																
(2) Accrual_PF	0.810	1.000															
(3) Accrual_NL	0.754	0.740	1.000														
(4) RE_PD	0.292	0.290	0.266	1.000													
(5) Post	-0.024	-0.037	-0.040	-0.046	1.000												
(6) Treat	0.041	0.038	0.037	0.012	0.496	1.000											
(7) Size	-0.276	-0.268	-0.279	-0.304	0.126	0.119	1.000										
(8) MB	0.126	0.119	0.115	0.094	0.055	0.149	0.254	1.000									
(9) Leverage	-0.171	-0.182	-0.144	-0.169	0.086	0.042	0.161	-0.035	1.000								
(10) Cash	0.256	0.299	0.260	0.189	-0.020	0.051	-0.280	0.225	-0.443	1.000							
(11) IO	-0.181	-0.165	-0.173	-0.168	0.111	-0.020	0.304	-0.074	0.118	-0.172	1.000						
(12) R&D	0.304	0.348	0.295	0.252	0.000	0.061	-0.310	0.198	-0.347	0.621	-0.237	1.000					
(13) BIG4	-0.151	-0.118	-0.128	-0.149	0.033	0.041	0.389	0.039	0.098	-0.041	0.326	-0.063	1.000				
(14) MA	-0.035	0.001	-0.024	-0.037	-0.002	0.056	0.409	0.228	-0.150	0.107	0.028	0.105	0.099	1.000			
(15) Merge	-0.158	-0.138	-0.160	-0.112	0.093	-0.009	0.350	0.009	0.116	-0.238	0.215	-0.170	0.154	0.124	1.000		
(16) Issue	0.048	0.035	0.045	0.083	-0.016	0.036	-0.102	0.082	0.191	0.001	-0.110	0.019	-0.046	-0.042	0.006	1.000	
(17) Z-score	-0.267	-0.288	-0.250	-0.204	-0.007	-0.071	0.428	-0.021	-0.052	-0.319	0.388	-0.487	0.151	0.203	0.186	-0.148	1.000

The table provides Pearson correlation coefficients. All variables are provided in Appendix A. ***, ** and * indicate the 1%, 5%, and 10% significance levels, respectively.

Table 3 Effect of strategic alliances on accrual-based earnings management

	(1)	(2)	(3)
	Accrual_MJ	*Accrual_PF*	*Accrual_NL*
Treat x Post	-0.003**	-0.004***	-0.004***
	(-2.216)	(-3.145)	(-2.709)
Size	0.001	-0.001	-0.001
	(0.596)	(-1.381)	(-0.603)
MB	0.001***	0.001***	0.001***
	(4.698)	(4.287)	(5.256)
Leverage	-0.012*	-0.020***	-0.005
	(-1.697)	(-3.255)	(-0.712)
Cash	0.001	0.006	0.003
	(0.127)	(1.038)	(0.506)
IO	0.003	0.012***	-0.002
	(0.742)	(2.924)	(-0.435)
R&D	0.121***	0.110***	0.103***
	(5.758)	(5.829)	(5.623)
BIG4	-0.007**	-0.002	0.001
	(-2.357)	(-0.683)	(0.475)
MA	-0.004	-0.000	-0.001
	(-1.004)	(-0.123)	(-0.154)
Merge	0.000	0.001	0.000
	(0.061)	(1.422)	(0.327)
Issue	-0.003**	-0.003**	-0.003***
	(-2.479)	(-2.496)	(-2.816)
Z-score	-0.002*	-0.002*	-0.001
	(-1.697)	(-1.698)	(-1.082)
constant	0.032***	0.038***	0.035***
	(3.158)	(4.400)	(3.637)
Pair FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	10927	10948	10948
R^2	0.445	0.464	0.436

The table presents the difference-in-differences analysis of strategic alliance on earnings management. The treatment group (Treat) includes firms that form a strategic alliance. The control group (Control) is selected by the pair matching method. Our detail matching procedure is described in Section 3.3. Column (1), (2) and (3) use Modified Jones Model, performance model by Kothari et al. (2005), non-linear model by Ball and Shivakumar (2006) as the proxy for earnings management. All variables are defined in Appendix A. The t-statistics are reported in the parenthesis below the coefficient, and standard errors are clustered at the pair level. ***, ** and * indicate the 1%, 5%, and 10% significance levels, respectively.

Table 4 Parallel trend assumption and falsification tests

Panel A: Parallel Trend Test

	(1) *Accrual_MJ*	(2) *Accrual_PF*	(3) *Accrual_NL*
Before3^{-}	-0.003	-0.003	-0.002
	(-1.577)	(-1.610)	(-1.466)
Before2	-0.003	-0.002	-0.003
	(-1.123)	(-0.845)	(-1.478)
Before1	-0.002	-0.002	-0.003
	(-0.796)	(-0.986)	(-1.567)
Current	-0.006**	-0.001	-0.000
	(-2.160)	(-0.345)	(-0.047)
After1	-0.007**	-0.006***	-0.005**
	(-2.534)	(-2.581)	(-2.236)
After2	-0.006*	-0.006***	-0.005**
	(-1.921)	(-2.730)	(-2.111)
After3^{+}	-0.007**	-0.005*	-0.006**
	(-2.140)	(-1.720)	(-2.130)
Controls	Yes	Yes	Yes
Pair FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	10927	10948	10948
R^2	0.465	0.464	0.436

Panel B: Falsification Test

	(1) *Accrual_MJ*	(2) *Accrual_PF*	(3) *Accrual_NL*
False x Post	-0.001	-0.002	-0.001
	(-0.361)	(-1.297)	(-0.989)
Controls	Yes	Yes	Yes
Pair FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	9328	9348	9348
R^2	0.469	0.484	0.463

Panel A presents tests on the parallel trend assumption in which the baseline model is re-estimated replaced by seven dummy variables. *Before 3*$^{-}$ equals one if it is three and four years before the strategic alliance year and zero otherwise. *Before 2* and *Before 1* equal one if it is two years or one year before the strategic alliance year and zero otherwise. *Current* equals one if it is the year in which firms form a strategic alliance and zero otherwise. *After 1* and *After 2* equal to one if it is respectively, one year and two years after strategic alliance year. *After 3*$^{+}$ equals to one if at least three years after the strategic alliance year and zero otherwise. Panel B reports the baseline regression, where False is a pseudo strategic alliance year created by using the periods that precedes three years prior to the strategic alliance; it takes the value of one starting from the pseudo alliance year and zero otherwise. Other variables are defined in Appendix A. The t-statistics are reported in the parenthesis below the coefficient, and standard errors are clustered at the pair level. ***, ** and * indicate the 1%, 5%, and 10% significance levels, respectively.

Table 5

Panel A: Disciplinary mechanism	
	(1)
	E-index
Treat x Post	-0.495*
	(-1.852)
Size	-0.073
	(-1.022)
MB	0.016
	(1.530)
Leverage	0.158
	(0.397)
Cash	0.009
	(0.025)
IO	0.010
	(0.084)
R&D	-0.027
	(-0.230)
BIG4	-0.462
	(-1.647)
MA	0.004
	(0.062)
Merge	-0.198**
	(-2.060)
Issue	-0.900***
	(-3.473)
Z-score	0.029
	(0.934)
constant	3.409***
	(5.095)
Observations	1006
R^2	0.907
Pair FE	Yes

Panel B: regression surrounding strategic alliance formation			
	(1)	(2)	(3)
	Δ*Accrual_MJ*	Δ*Accrual_PF*	Δ*Accrual_NL*
Δ*E-Index*	0.003**	0.002*	0.002**
	(2.142)	(1.831)	(2.267)
Δ*Size*	-0.002	-0.003	-0.004**
	(-0.652)	(-1.517)	(-1.967)
Δ*MB*	-0.000	-0.000	-0.000*
	(-0.901)	(-0.658)	(-1.734)
Δ*Leverage*	0.001	-0.011	-0.011
	(0.064)	(-1.264)	(-1.177)
Δ*Cash*	0.007	0.011	0.003
	(0.546)	(1.013)	(0.311)
Δ*IO*	-0.002	-0.001	-0.006
	(-0.202)	(-0.077)	(-0.712)
Δ*R&D*	0.001	-0.000	-0.001
	(0.348)	(-0.195)	(-0.377)
Δ*BIG4*	0.011	0.016*	0.011
	(0.977)	(1.784)	(1.204)
Δ*MA*	-0.012	-0.000	-0.001
	(-1.120)	(-0.038)	(-0.162)

Δ*Merge*	-0.006	-0.005*	-0.006*
	(-1.543)	(-1.673)	(-1.938)
Δ*Issue*	-0.000	-0.000	0.002
	(-0.017)	(-0.007)	(0.447)
Δ*Z-score*	-0.001	-0.000	-0.000
	(-1.169)	(-0.928)	(-0.577)
constant	-0.005**	-0.004**	-0.005***
	(-2.255)	(-2.553)	(-2.785)
Observations	520	521	521
R^2	0.029	0.035	0.044

Panel A presents a difference-in-differences test on how changes in earnings management surrounding strategic alliance affect *E-index*. The difference-in-differences tests is based on the matched sample used in Section 3.3. Panel B reports the regression results with ΔEM as the dependent variable based on the matched sample. Δ represents the mean (i.e., average) change of variables from pre-alliance to post-alliance. All variables are defined in Appendix A. The t-statistics are reported in the parenthesis below the coefficient, and standard errors are clustered at the pair level. ***, ** and * indicate the 1%, 5%, and 10% significance levels, respectively.

Table 6

Panel A: Certification mechanism

	(1) *Goodwill*
Treat x Post	0.016***
	(3.238)
Size	0.016**
	(2.114)
MB	-0.005***
	(-3.133)
Leverage	0.044
	(1.245)
Cash	-0.119***
	(-2.746)
IO	0.109
	(1.343)
R&D	0.012
	(0.841)
BIG4	-0.001
	(-0.034)
MA	0.015*
	(1.963)
Merge	0.007
	(0.796)
Issue	0.036
	(1.247)
Z-score	0.003
	(0.970)
constant	-0.017
	(-0.293)
Observations	1174
R^2	0.752
Pair FE	Yes

Panel B: regression surrounding strategic alliance formation

	(1) Δ*Accrual_MJ*	(2) Δ*Accrual_PF*	(3) Δ*Accrual_NL*
Δ*Goodwill*	-0.048**	-0.049***	-0.035**
	(-2.545)	(-2.995)	(-1.997)
Δ*Size*	-0.001	-0.004*	-0.002
	(-0.334)	(-1.651)	(-0.841)
Δ*MB*	0.003***	0.002***	-0.000
	(4.049)	(3.714)	(-1.549)
Δ*Leverage*	-0.021	-0.026**	-0.000
	(-1.531)	(-2.222)	(-0.027)
Δ*Cash*	-0.034***	-0.027**	-0.025**
	(-2.632)	(-2.427)	(-2.147)
Δ*IO*	0.005	0.015*	0.003
	(0.488)	(1.752)	(0.375)
Δ*R&D*	0.025	0.004	-0.030
	(0.916)	(0.169)	(-1.212)
Δ*BIG4*	-0.015**	-0.004	-0.002
	(-2.204)	(-0.758)	(-0.297)
Δ*MA*	-0.029**	-0.009	-0.001
	(-2.492)	(-0.863)	(-0.114)
Δ*Merge*	-0.006*	-0.004	-0.006*

	(-1.741)	(-1.358)	(-1.709)
Δ*Issue*	-0.001	-0.000	-0.005
	(-0.230)	(-0.133)	(-1.304)
Δ*Z-score*	-0.001	0.000	0.000
	(-1.515)	(0.123)	(0.566)
constant	0.002	-0.000	-0.001
	(0.992)	(-0.260)	(-0.508)
Observations	659	660	660
R^2	0.066	0.055	0.031

Panel A presents a difference-in-differences test on how changes in earnings management surrounding strategic alliance affect *Goodwill*. The difference-in-differences tests is based on the matched sample used in Section 3.3. Panel B reports the regression results with ΔEM as the dependent variable based on the matched sample. Δ represents the mean (i.e., average) change of variables from pre-alliance to post-alliance. All variables are defined in Appendix A. The t-statistics are reported in the parenthesis below the coefficient, and standard errors are clustered at the pair level. ***, ** and * indicate the 1%, 5%, and 10% significance levels, respectively.

Table 7 Cross-sectional Analysis

Panel A

	(1)	(2)	(3)	(4)	(5)	(6)
	Accrual_MJ		*Accrual_PF*		*Accrual_NL*	
	Related Partnerships	*Diversifying partnerships*	*Related Partnerships*	*Diversifying partnerships*	*Related Partnerships*	*Diversifying partnerships*
Treat x Post	-0.001	-0.005***	-0.001	-0.006***	-0.002	-0.004**
	(-0.250)	(-2.697)	(-0.441)	(-3.740)	(-1.106)	(-2.563)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4345	6582	4360	6588	4360	6588
R^2	0.444	0.439	0.460	0.458	0.444	0.423

Panel B

	(1)	(2)	(3)	(4)	(5)	(6)
	Accrual_MJ		*Accrual_PF*		*Accrual_NL*	
	Relative Size = 1	*Relative Size = 0*	*Relative Size = 1*	*Relative Size = 0*	*Relative Size = 1*	*Relative Size = 0*
Treat x Post	-0.003*	-0.003	-0.003**	-0.005**	-0.002	-0.004*
	(-1.956)	(-1.165)	(-2.101)	(-2.218)	(-1.520)	(-1.696)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5100	5827	5103	5845	5103	5845
R^2	0.453	0.449	0.448	0.469	0.468	0.426

Panel C

	(1)	(2)	(3)	(4)	(5)	(6)
	Accrual_MJ		*Accrual_PF*		*Accrual_NL*	
	One-link firms	*Many-link firms*	*One-link firms*	*Many-link firms*	*One-link firms*	*Many-link firms*
Post	-0.005**	-0.011***	-0.003	-0.008**	-0.003	-0.006**
	(-2.272)	(-3.262)	(-1.192)	(-2.470)	(-1.192)	(-2.247)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4160	1352	4170	1352	4170	1352
R^2	0.474	0.503	0.497	0.494	0.497	0.529

Panel A reports the result of the industries in which the partner firms operate. Whether strategic alliance is in the same industry (*Related Partnerships)* or between different industries (*Diversifying partnerships)* is determined based on the two-digit Standard Industrial Classification (SIC) codes. Panel B reports the result of the relative size of partner firms (*Relative Size)*. We define *Relative Size* as one if firm's market value is greater than its pair and zero otherwise. Panel C reports the result based on firm's alliance network centrality. *Degree centrality* is the total number of alliance connections a firm has to other firms in the network. If *Degree centrality* is greater than 1, firms are *one-link firms*, otherwise, they are *many-link firms*. All variables are defined in Appendix A. The t-statistics are reported in the parenthesis below the coefficient, and standard errors are clustered at the pair level. ***, ** and * indicate the 1%, 5%, and 10% significance levels, respectively.

Table 8 Pair Similarity analysis

	(1)	(2)	(3)
	|ΔAccrual_MJ|	|ΔAccrual_PF|	|ΔAccrual_NL|
Treat x Post	-0.004**	-0.006***	-0.006**
	(-2.130)	(-2.794)	(-1.995)
Size	-0.000	-0.001	-0.001
	(-0.101)	(-0.313)	(-0.378)
Size_P	-0.002	0.002	-0.000
	(-0.838)	(0.533)	(-0.010)
MB	-0.000	-0.000	0.000
	(-0.870)	(-0.600)	(0.156)
MB_P	0.001**	0.002**	0.002***
	(2.243)	(2.275)	(2.651)
Leverage	-0.003	0.017	0.003
	(-0.242)	(1.368)	(0.272)
Leverage_P	-0.020**	-0.011	-0.023**
	(-2.178)	(-0.902)	(-2.105)
Cash	0.013	0.002	0.006
	(1.319)	(0.198)	(0.418)
Cash_P	0.006	0.000	0.010
	(0.650)	(0.012)	(0.943)
IO	0.008	0.014	0.010
	(0.905)	(1.350)	(1.052)
IO_P	0.006	0.020**	0.014
	(0.932)	(2.083)	(1.283)
R&D	0.050	-0.015	-0.030
	(1.640)	(-0.313)	(-0.678)
R&D_P	0.009	0.015	0.013
	(1.235)	(0.983)	(1.008)
BIG4	0.003	0.003	0.014**
	(0.588)	(0.413)	(2.358)
BIG4_P	-0.006	-0.003	-0.008
	(-1.480)	(-0.582)	(-1.271)
MA	0.000	-0.002	0.002
	(0.022)	(-0.252)	(0.196)
MA_P	-0.001	0.008	-0.000
	(-0.107)	(0.605)	(-0.040)
Merge	0.003*	0.002	-0.001
	(1.934)	(0.805)	(-0.324)
Merge_P	-0.000	0.001	-0.000
	(-0.162)	(0.472)	(-0.230)
Issue	0.001	-0.001	-0.002
	(0.421)	(-0.614)	(-1.017)
Issue_P	0.002	0.001	-0.003
	(0.786)	(0.460)	(-1.194)
Z-Score	0.002	0.001	-0.001
	(0.856)	(0.259)	(-0.304)
Z-Score_P	-0.002*	-0.006***	-0.006***
	(-1.842)	(-3.509)	(-3.611)
constant	0.037*	0.011	0.031
	(1.795)	(0.360)	(1.085)
Pair FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	6704	6735	6735
R^2	0.396	0.386	0.365

This table reports regression results for the pairwise difference (or similarity) in earnings management (i.e., $\Delta EM_{ij} = |EM_i - EM_j|$. All variables are defined in Appendix A. The t-statistics are reported in the parenthesis below the coefficient, and standard errors are clustered at both firms' level using the double-clustering algorithm from Petersen (2008) and Thompson (2011). ***, ** and * indicate the 1%, 5%, and 10% significance levels, respectively.

Table 9 Effect of strategic alliances on real earnings management

	(7)	(8)
	RM_PD	*RM_PD*
Treat x Post	-0.008**	-0.008*
	(-2.432)	(-1.868)
Size	-0.007*	-0.005
	(-1.770)	(-1.359)
MB	0.003***	0.003***
	(3.176)	(3.089)
Leverage	-0.080***	-0.075***
	(-3.961)	(-3.593)
Cash	0.034*	0.035*
	(1.954)	(1.952)
IO	-0.017	-0.018
	(-1.183)	(-1.257)
R&D	0.336***	0.318***
	(4.704)	(4.205)
BIG4	-0.015	-0.016
	(-1.129)	(-1.246)
MA	-0.022*	-0.022*
	(-1.674)	(-1.731)
Merge	0.008***	0.007**
	(2.705)	(2.427)
Issue	0.008**	0.006*
	(2.099)	(1.746)
Z-score	-0.012***	-0.014***
	(-4.051)	(-4.590)
constant	0.186***	0.178***
	(5.436)	(5.262)
Year FE	Yes	Yes
Pair FE	No	Yes
Firm FE	Yes	No
Observations	9528	9528
R^2	0.541	0.559

This table reports the regression using alternative measures of earnings management: real earnings management (*RM_PD)*. *RM_PD* is the standardized variable of abnormal discretionary expenses (*RM_DISX*) multiplied by negative one to the standardized variable of abnormal production costs (*RM_PROD*). Column (1) presents the regressions with year fixed effects. Column (2) reports the regressions with pair fixed effects. All variables are defined in Appendix A. Standard errors are clustered by pair. ***, ** and * indicate the 1%, 5%, and 10% significance levels, respectively.

Table 10 Alternative robustness tests

Panel A

	(1) *Accrual_MJ*	(2) *Accrual_PF*	(3) *Accrual_NL*
Treat x Post	-0.002**	-0.003***	-0.003***
	(-2.106)	(-2.896)	(-2.641)
Controls	Yes	Yes	Yes
Pair FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	10927	10948	10948
R^2	0.425	0.446	0.418

Panel B

	(1) *Accrual_MJ*	(2) *Accrual_PF*	(3) *Accrual_NL*	(4) *Accrual_MJ*	(5) *Accrual_PF*	(6) *Accrual_NL*
Treat x Post	-0.003**	-0.003**	-0.003***	-0.003**	-0.004***	-0.004***
	(-2.056)	(-2.023)	(-2.638)	(-2.259)	(-3.192)	(-2.718)
Interlock	-0.005***	-0.004**	-0.002			
	(-2.674)	(-2.147)	(-1.133)			
Shared Auditor				-0.003	-0.003	-0.000
				(-1.437)	(-1.522)	(-0.279)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7386	7391	7391	10927	10948	10948
R^2	0.409	0.434	0.405	0.445	0.464	0.436

Panel A presents the regression with firm fixed effects. Panel B reports the results for the effect of strategic alliances on earnings management, controlling for other networks. Model (1) – (3) reports the regression with board interlock (*Interlock*) as an additional control. Model (4)-(6) reports the regression with shared auditor (*Shared Auditor)* as an additional control. All variables are defined in Appendix A. The t-statistics are reported in the parenthesis below the coefficient, and standard errors are clustered at the pair level. ***, ** and * indicate the 1%, 5%, and 10% significance levels, respectively.