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How do market power and industry competition influence the effect of corporate governance on earnings management?

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ABSTRACT

Previous studies on the relationship between corporate governance and earnings management have shown different results. This study explores how market power and industry competition influence the effect of corporate governance on earnings management in Taiwan. Industry competition is an industry-level measure for the competition among firms. Firm market power is a firm-level measure for the power to compete with external competition. We discover that firms with low market power and those faced with intense market competition are more likely to engage in earnings management. Market power demonstrates a more significant effect than industry competition on managerial earnings manipulation. Moreover, when market power is weak or industry competition is fierce, corporate governance cannot mitigate earnings management. Regression results considering the interaction between market power and industry competition reveals a stronger effect of corporate governance on earnings management than those evaluated based on market power or industry competition alone. Our findings provide a possible explanation for the different relationship between corporate governance and earnings management.

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1. Introduction

Several studies have shown that product market competition can influence a firm's decision making regarding investment decision, financial decision, earnings prediction, and capital allocation (Haushalter, Klasa, & Maxwell, 2006). Recent studies further indicate that product market competition could induce managers to manipulate a firm's financial performance and stock returns through earnings management (EM). Operating in a highly competitive industry could reduce a firm's profitability, rendering it more difficult to achieve financial targets. Consequently, managers would be more likely to employ EM (Markarian & Santaló, 2014). Meanwhile, firms with weak pricing power in the product market are likely to window-dress their earnings through discretionary accruals. If a firm's products do not differentiate in the competitive product market, this will reduce a firm's competitiveness and profit

margins, thereby inducing managers to embellish their operating results using EM (Mitra, Hossain, & Jain, 2013).

Previous studies on the relationship between corporate governance and EM have shown inconsistent results. Dechow, Sloan, and Sweeney (1996) found that board size and discretionary accruals have a negative relationship, while Jensen (1993) and Yermack (1996) contended that a small board size could have effects on the actions of CEOs (Chief Executive Officers). Warfield, Wild, and Wild (1995) discovered that an increase in managerial ownership could link managers' interests with firm value, and subsequently reduce financial statement manipulation, consistent with the convergence-of-interest hypothesis. Cheng and Warfield (2005) as well as Tang, Chen, and Chang (2013) found that managerial ownership and discretionary accruals had a significantly positive relationship, supporting the managerial entrenchment hypothesis. Studies concerning the relationship between institutional ownership and EM also presented dissimilar findings. Some studies argued that institutional investors have the abilities and resources to monitor the opportunistic behavior of managers, showing the monitoring effect of institutional investors on EM (Chung, Firth, & Kim, 2002; Cornett, Marcus, & Tehranian, 2008).

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Other studies pointed out that some institutional investors are shortsighted and seek immediate benefits and short-term performance. This could induce managers to manipulate earnings to meet institutional investors' expectations of short-term performance (Graves, 1988; Matsumoto, 2002). Based on these previous studies, this study infers that the inconsistency in these research results might be due to interference from certain key factors, such as the industry's competitive environment.

Giroud and Mueller (2011) found that the influence of corporate governance on firm performance and stock returns was significant and positive in industries with low competition but insubstantial in highly competitive industries. The research has found that managers in less-competitive industries are free from pressure to strengthen their norms, making the oversight of corporate governance urgent. Managers in highly competitive industries fear that their companies could lose competitiveness and market share, and thus have a strong incentive to reduce negligent behavior and are committed to allocating corporate resources effectively, without the need for supervision through corporate governance (Ammann, Oesch, & Schmid, 2013; Chen, Kao, & Lu, 2014). Therefore, the abovementioned studies support the monitoring effect of competitive industrial environments on managers. However, this view conflicts with Datta, Iskandar-Datta, and Singh (2013), and Markarian and Santaló (2014), who discuss the possible pressure of market competitiveness on managers and their resultant increase in EM.

Datta et al. (2013) pointed out that, in addition to discretionary accruals, product market competition could also increase a firm's real EM activities, particularly when the firm's performance is inferior to that of their competitors (Markarian & Santaló, 2014). Mitra et al. (2013) found that a firm might not employ real earnings management (REM) if it has a stronger product market power¹ with which to differentiate its products and subsequently obtain good returns; however, there is no significant relationship between discretionary accruals and product market power.

Although Giroud and Mueller (2011) suggested that corporate governance and production market competition (proxy by Herfindahl–Hirschman Index, HHI) are substitutes in enhancing firm performance, we infer that the same relationship might not exist when this comes to disciplining earnings management. Therefore, this study explores the influence of market power and market competition on the relationship between corporate governance mechanisms and EM. It aims to understand whether product market competition, as an external supervisory mechanism, could replace internal corporate governance and reduce managers' use of EM, or whether it could pressure managers, weaken the supervision of corporate governance, and thus further induce them to manipulate EM.

Taiwan stock market provides a particularly interesting case to investigate this issue for following reasons. Taiwanese listed firms exhibited high-level earnings management (Choi, Choi, & Sohn, 2018; Leuz, Nanda, & Wysocki, 2003), widespread family-control (Yeh & Woitke, 2005) and large ownership-control wedge. Taiwan stock market presented extremely high real earnings management in a sample of 22 countries by Choi et al. (2018) and was ranked sixth for aggregate earnings management in a survey of 31 countries by Leuz et al. (2003). Family-controlling shareholders in Taiwan typically used pyramid structures or cross-shareholding to obtain greater control. The ownership-control separation led to more agency problems. Besides, Chi, Hung, Cheng, and Lieu (2015) showed that family control firms presented increased earnings management. Therefore, this study adopted Taiwanese data

to investigate whether product market competition, proxied by market power and industry competition, affects the relationship between various corporate governance and aggregate earnings management.

After the implementation of the Sarbanes–Oxley Act (SOX), many firms gradually began to employ real operational activities for EM, such as offering discounts to expand sales revenue, using excess production to reduce fixed costs per unit or reducing discretionary expenses. In other words, firms turn to adopting REM to avoid detection by competent authorities and accountants (Gunny, 2010; Roychowdhury, 2006). Cohen and Zarowin (2010) found a complementary relationship between accrual-based EM and REM activities. To measure the degree of a firm's total EM, our study estimates the total amount of REM and adds to accrual-based EM to obtain the aggregate EM (Cohen & Zarowin, 2010; Tang, 2016), and then test the impact of product market competition on the relationship between corporate governance and EM.

We measure product market power and industry competition using the value-weighted and industry-adjusted Lerner Index, and the Herfindahl–Hirschman Index (HHI) covering the past three years, separately. Because the interaction between product market power and industry competition could intensify the degree of EM, this study further multiplies the two to take into account simultaneously competition within and between industries. The reason is as follow: when a firm's market power is weak, its profit margins reduce. This situation could worsen if the firm is in a highly competitive industry. Such a situation would further induce managers to employ accrual-based or real operational activities for earnings adjustment. This could also reduce the effect of corporate governance on EM, resulting in the failure of corporate governance mechanisms. We argue that combining firm market power and industry competition, the effect of corporate governance on earnings management is stronger than market power or industry competition itself.

The mean difference test between high–low market power show that firms with high market power have significantly less aggregate REM and TotalEM than do those with low market power. While the mean difference of aggregate REM and TotalEM is less significant for the groups classified by industry competition. The regression results reveal that firm market power has a significantly negative influence on both REM and TotalEM, indicating that the higher the firm market power, the less a firm needs to enhance financial statements through EM. Notably, the negative impact of industry competition on EM is less significant. Split sample regression results show that the effect of corporate governance on EM is quite different between high–low market power groups and high–low industry competition groups, separately. For the group with weak market power or high industry competition, corporate governance tends to have less of an effect on managers' earnings manipulation. The results of the grouping formed by multiplying market power and industry competition show that, in the group with strong market power and low industry competition, the ownership of managers and domestic institutional investors has a significantly negative impact on EM. Conversely, in the group with weak market power and high industry competition, both ownership types have a significantly positive impact on EM. This result implies that, for firms with less market power and in the competitive environment, the higher the managerial ownership, the greater the inducement managers may have to present better profits for their own interests by using EM; domestic institutional investors could ignore managers' earnings manipulation to protect their own investment returns. In this group, turnover rates of the board chairman are also significantly and positively related to the extent of EM. Taking together, combining industry competition and firm market power is stronger than industry competition or market power itself for the effect of corporate governance on earnings management.

¹ Market power refers to the ability of a firm to increase the prices of its products or services without reducing too much demand.

This study has three major contributions: (1) To the best of our knowledge, this is the first study investigating whether market power and industry competition influence the relationship between a variety of corporate governance and aggregate EM². Our findings provide an explanation to the inconsistent relationship between corporate governance and earnings management. (2) This study shows that firms with weak market power or in a high competitive industry are more likely to use earnings management for upward adjustment, leading to the failure of corporate governance. Particularly, this study demonstrates that weak market power provides a stronger incentive for real earnings management than intensive industry competition does. (3) This study is the first to discover that, consideration of the interaction effect of market power and industry competition, the impact of corporate governance on earnings management is stronger than those evaluated with market power or industry competition alone. Therefore, this study not only fills the gap in the related literature, but can also provide new insights for investors, firms and regulatory institutions regarding the impact of product market competition on the relationship between corporate governance and managerial EM behavior. The results of this study have significant research value and managerial implications.

The remainder of the paper is organized as follows. Section 2 explores relevant studies and introduces the research hypotheses concerning the relationship among market power, industry competition, corporate governance mechanisms, and EM. Section 3 describes the study's research samples, defines the important variables, and establishes the research models. Section 4 discusses the descriptive statistics and empirical findings. Final section presents the findings and managerial implications of this study.

2. Literature review and research hypotheses

Schmidt (1997) found that product market competition could have two different effects on managerial incentives. When competitors enter the industry, managers may work harder to avoid the threat of corporate liquidation. Conversely, excessive competition pressure could also reduce their incentives to work hard. Ammann et al. (2013) and Giroud and Mueller (2011) believed that, in highly competitive industries, managers are concerned about losing market share and hence dare not neglect their duties. Consequently, they commit to the effective allocation of corporate resources. They thus argued that industry competition pressure could be regarded as a supervision mechanism in lieu of the supervisory role of internal corporate governance, which reduces agency problems and managers' inefficient decisions. Therefore, in highly competitive industries, it is not necessary to supervise managers through corporate governance mechanisms to ensure their hard work. Conversely, in less competitive industries, managers lack pressure from external competition. In this case, a sound corporate governance mechanism is required to effectively supervise managers' EM behaviors (Chen et al., 2014; Chou, Ng, Sibilkov, & Wang, 2011).

In recent years, several studies have stated that product market competition could increase managers' incentives to employ EM to improve financial performance and stock returns (Markarian & Santaló, 2014; Shleifer, 2004). Previous studies often used market power and industry competition to measure product market

competition (Datta et al., 2013; Mitra et al., 2013). When a firm has strong product differentiation capacity or low product substitutability, customers' elasticity of demand for the products is low. Therefore, firms with higher market power could enjoy more stable cash flow and stock returns than those with lower market power (Peress, 2010). Conversely, firms with low market power could be likely to window-dress their earnings using discretionary accruals. Moreover, if there are more firms in the industry, the competition will be stronger, making it difficult for firms to maintain high pricing capability and profitability. For instance, in a perfectly competitive market, a firm is usually the price taker. Once the product's price increases, customers could purchase from other firms. Hence, industry competition may cause high-cost firms to lose profitability. Managers are under greater pressure to achieve earnings targets, which, in this case, could induce opportunistic decision-making behavior intended to safeguard their jobs. In addition, in highly competitive industries, managers are required to maintain less transparent earnings to minimize information leakage to competitors. Consequently, such managers may practice EM more actively to avoid the threat of liquidation.

After SOX was enacted in 2002, an increasing number of firms converted to REM from accrual-based EM (Cohen, Dey, & Lys, 2008). Studies began focusing on measuring REM. Graham, Harvey, and Rajgopal (2005) indicated that managers prefer to adopt real operational activities for EM because accountants and competent authorities cannot detect these activities easily. Mitra et al. (2013) found that product market power had a significantly negative influence on REM because firms with stronger market power could obtain higher profits more easily, without the need to practice EM via real operational activities to achieve earnings targets. They did not find a significant relationship between product market power and accrual-based EM. Markarian and Santaló (2014) also found a prominent relationship between industry competition and EM and discovered that managers in competitive markets were more likely to utilize REM to reach their firm's expected performance. Moreover, a firm's performance relative to that of peer firms in the same industry is also an important determinant of earnings manipulation, particularly when the firm's performance is inferior to that of its competitors.

According to the above-mentioned studies, this study proposes Hypotheses 1 and 2 as follows:

Hypothesis 1. Product market power is negatively related to the degree of earnings management.

Hypothesis 2. Industry competition is positively related to the degree of earnings management.

Previous studies have found that corporate governance mechanisms play an important role in the supervision of EM (Cornett, McNutt, & Tehranian, 2009; Krishnan, 2003; Shen & Chih, 2007). The board of directors is the core of corporate governance, and its composition and independence significantly influence supervision efficiency. Dechow et al. (1996) found that board size and discretionary accruals had a negative relationship because a large board enables firms to choose directors with expertise in various fields, and are less likely to control by insiders. Besides, the more independent the board is, the stronger will be the effect of supervision on managers' EM through financial accounting procedures (Brickley, Coles, & Terry, 1994; Klein, 2002).

Studies have offered various arguments on the monitoring effect of ownership structure. According to the convergence-of-interest hypothesis, when managers hold more shares, their interests are more in line with the interests of their firms, making them less likely to neglect other stakeholders' interests through accounting discretion (Warfield et al., 1995). Cheng and Warfield (2005) found that managerial ownership and discretionary accruals had a remarkably

² This study is different from Lemma, Negash, Mlilo, and Lulseged, (2018)) that focused on the effect of institutional ownership and product market competition in curbing accrual and real earnings management. Besides, Lemma et al. include direct shares owned by financial related industries as institutional ownership, such as financial firms, insurance companies, banks, mutual and pension funds, private equity firms, venture capitals, and hedge funds.

positive relationship, implying that managerial ownership could hinder the effect of corporate governance mechanisms, consistent with the managerial entrenchment hypothesis (Jensen & Ruback, 1983). Notably, Warfield et al. uses the absolute value of accruals, while Cheng and Warfield uses signed accruals. They also use comprehensive measures of ownership.

Studies concerning the monitoring effect of institutional investors on EM also reported different viewpoints. Most argued that, unlike individual investors, institutional investors usually have the abilities and resources to supervise managers' opportunistic behaviors. Particularly, institutional investors who hold more shares have more incentives to actively monitor the firms in which they have invested. Therefore, increased institutional ownership could reduce managers' earnings manipulation (Chung et al., 2002; Cornett et al., 2008; Shleifer & Vishny, 1986). Other studies found that institutional investors tended to focus on short-term performance and conduct short-swing trading, which is likely to increase managers' incentives to manipulate earnings to meet their expectations for short-term performance (Graves & Waddock, 1990; Matsumoto, 2002).³

Giroud and Mueller (2011) found that, in the most competitive industry hedge portfolio (i.e., that with the lowest industrial concentration), the relationship between the Governance index (Gompers, Ishii, & Metrick, 2003) and corporate values was not significant; however, in the least competitive industry hedge portfolio (i.e., that with the highest industrial concentration), the Governance index had a greater and more significant relationship with corporate values. After the passage of the state takeover laws, the operating performance of firms in less-competitive industries experienced a significant decline, while these laws had no significant impact on firms in highly competitive industries. The studies also found that, in less-competitive industries, firms with poor corporate governance had low stock returns, operating performance, and corporate values. The above findings imply that the competitive industry environment could influence the effects of corporate governance on managers. Kao and Chen (2013) also found that product market competition could influence the relationship between corporate governance and dividend payout.

Previous studies have shown mixed results on the relationship between corporate governance and EM, while the inconsistency may be partly due to the influence of market power and industry competition. When a firm's products lack the market power required to maintain adequate profits or when managers find it difficult to achieve financial goals in a competitive environment, the incentives to use EM for better earnings increase. This could reduce the effect of corporate governance on EM, resulting in the failure of corporate governance. Specifically, managers of firm with strong market power or in a less competitive market have reduced need to manipulate financial earnings through EM; hence, most corporate governance mechanisms could still work properly. On the contrary, managers of firms with low market power or in a highly competitive industry tend to using EM to achieve market expectations. This could lead to the failure of corporate governance mechanisms. Besides, in a competitive environment, if the board chair or CEO turnovers frequently, managers may have more opportunities and inducements to manipulate earnings. This study infers that market power and competition environments are very likely to explain the inconsistent results in corporate governance studies. Therefore, this study investigates whether market power and com-

petition environments influence the effect of corporate governance on EM, and proposes Hypothesis 3 and 4.

Hypothesis 3. Product market power has a significant effect on the relationship between corporate governance and earnings management.

Hypothesis 4. Industry competition has a significant effect on the relationship between corporate governance and earnings management.

Although numerous studies have investigated the relationship between corporate governance and earnings management (Cheng & Warfield, 2005; Warfield et al., 1995), or the relationship between product market competition and earnings management (Cheng, Man, & Yi, 2013), few studies have explored the influence of product market competition on the relation between corporate governance and EM.

This study infers that the interaction between product market power and industry competition could intensify the degree of EM. A firm with weak market power generally has lower profit margins. This situation could worsen if the firm is in a highly competitive industry and induce managers using accrual-based or real operational activities for EM. This could also reduce the effect of corporate governance on EM, accelerating the failure of corporate governance. Therefore, this study propose hypothesis 5 as follows:

Hypothesis 5. The interaction between product market power and industry competition could intensify the degree of EM and influence the effect of corporate governance on EM.

3. Research methods

3.1. Research samples and data sources

This study uses firms listed on the Taiwan Stock Exchange (TSE) and Taipei Exchange (over-the-counter) as a research sample. The data are obtained from the Taiwan Economic Journal (TEJ) database and cover 2003–2014. The sample criteria are the following: (1) to exclude financial firms, since the characteristics and regulatory constraints of the financial industry differ significantly from those of other industries; (2) to estimate industry competition based on all public firms; (3) to exclude the extreme values of product market power and industry competition; and (4) to exclude observations with missing data. In total, the final sample size was 11,494 firm-year observations.

3.2. Measurement of product market power and industry competition

This study employs market power and industry competition as the proxies for product market competition as follows.

3.2.1. Market power

Following previous research (Datta et al., 2013; Domowitz, Hubbard, & Petersen, 1986; Lindenberg & Ross, 1981), this study constructed a price-cost margin (PCM) based on the Lerner Index (LI) to measure market power, as shown in Eq. (1). As there could be significant differences in the PCM of different industries, this study adopted the value-weighted industry-adjusted LI as the measure of market power. Market power is measured as the difference between the PCM of individual firms and the sum of sales-weighted PCM of all firms in the industry, as shown in Eq. (2):

$$PCM_i = LI_i = \frac{Sales_i - COGS_i - SG\&A_i}{Sales_i} \quad (1)$$

³ It is worth noting that Chung et al. (2002) and Cornett et al. (2008) investigated overall institutional investors; whereas, Matsumoto focuses on transient institutional investors, and Graves and Waddock is a commentary instead of an empirical study.

$$MP_i = LI_i - \sum_{i=1}^N w_i LI_i \quad (2)$$

where PCM is the price-cost margin, namely the Lerner Index (LI) of firm *i*. Sales_{*i*} refers to the net sales; COGS_{*i*} refers to the cost of goods sold; SG&A_{*i*} is sales, general, and administrative expenses; MP represents value-weighted industry-adjusted market power; *w_i* represents the percentage of firm *i*'s annual sales relative to the market share of the industry; and *N* represents the number of firms in the industry.⁴

This study predicts that firms with higher market power have fewer incentives to embellish financial statements through EM. Strong market power indicates that a firm enjoys high product differentiation relative to competitors and thus low substitutability. In such a case, the products are expensive, but customers are still willing to buy them. Thus, the better the profitability, the less necessary it is for the firm to adjust their profit figures through EM.

3.2.2. Industry competition

This study adopts the Herfindahl-Hirschman Index (HHI) to measure industry competition (Abdoh & Varela, 2017; Haw, Hu, & Lee, 2015; Markarian & Santaló, 2014; Mitra et al., 2013). The definition of HHI is shown in Eq. (3). A low HHI indicates that there are many firms in the industry, the average market share of each firm is low, and industry competition is fierce. A very high HHI value indicates that the industry includes only a few large firms that could easily dominate the market, and hence, industry competition is low:

$$HHI_j = \sum_{i=1}^{n_i} w_{ij}^2 \quad (3)$$

In Eq. (3), HHI denotes industry concentration for industry *j*; *w_{ij}* represents the market share of firm *i* in industry *j*, i.e., firm *i*'s annual net sales divided by those of industry *j*. To accurately measure industry competition, this study adopts the industry's mean HHI value over the past three years. The study predicts that the more fierce the industry competition is (i.e., the lower the HHI), the more likely firms induced to embellish their financial statements through EM.

3.3. Measurement of earnings management

As indicated in the abovementioned studies, firms have gradually converted from accrual-based EM to real operational activities for EM to avoid being audited by accountants and competent authorities. Therefore, this study adopts REM and TotalEM as EM measure. REM represents the aggregate real EM. TotalEM is the sum of DCA and REM.

3.3.1. Accrual-based earnings management

Kothari, Leone, and Wasley (2005) suggested that, compared with traditional discretionary accruals (including the Jones model and its revised version), performance-matched discretionary accruals could be more capable of enhancing the reliability of inference on research conclusions concerning EM. Previous studies also found that managers are more inclined to manipulate earnings through discretionary current accruals (DCA) than through long-term discretionary accruals (Guenther, 1994; Teoh, Welch, & Wong, 1998). Following Kothari et al. (2005), this study uses performance-matched DCA estimated by the cross-sectional

⁴ As the financial information of non-public firms is difficult to obtain, this study considers only public firms when estimating market power and industry competition.

Jones model (Jones, 1991) to measure the extent to which firms employ an accrual basis for EM.

To estimate DCA, this study first calculated the CA of sample firms based on Eq. (4) and then incorporated it into Eq. (5) to estimate the coefficient (α_i) of the regression models by industry and by year. Next, this study incorporated the estimated coefficient ($\hat{\alpha}_i$) into Eq. (6) to calculate the NDCA of the sample firms. Lastly, the DCA was obtained by subtracting NDCA from CA. The details are shown in Eq. (7):

$$CA_{it} = [\Delta \text{Current asset}_{it} - \Delta \text{Cash}_{it} - (\Delta \text{Current liabilities}_{it} - \Delta \text{Current maturity of long-term debt}_{it})] \quad (4)$$

$$\frac{CA_{it}}{\text{Assets}_{it-1}} = \alpha_0 \times \frac{1}{\text{Assets}_{it-1}} + \alpha_1 \times \frac{(\Delta \text{Sales}_{it} - \Delta \text{AR}_{it})}{\text{Assets}_{it-1}} + \alpha_2 \times \text{ROA}_{it} + \varepsilon_{it} \quad (5)$$

$$\frac{NDCA_{it}}{\text{Assets}_{it-1}} = \hat{\alpha}_0 \times \frac{1}{\text{Assets}_{it-1}} + \hat{\alpha}_1 \times \frac{(\Delta \text{Sales}_{it} - \Delta \text{AR}_{it})}{\text{Assets}_{it-1}} + \hat{\alpha}_2 \times \text{ROA}_{it} \quad (6)$$

$$DCA_{it} = \frac{CA_{it}}{\text{Assets}_{it-1}} - \frac{NDCA_{it}}{\text{Assets}_{it-1}} \quad (7)$$

In the above equations, CA_{it} represents the current accruals; $\Delta \text{Current assets}_{it}$ represents the change in current assets; ΔCash_{it} represents the change in cash and cash equivalents; $\Delta \text{Current liabilities}_{it}$ represents the change in current liabilities; $\Delta \text{Current maturity of long-term debt}_{it}$ represents the change in long-term debt due within one year; ΔSales_{it} reflects the change in net sales; ΔAR_{it} represents the change in account receivables; ROA_{it} indicates the return on assets; Assets_{it-1} reflects the previous year's total assets; NDCA reflects non-discretionary current accruals; and DCA reflects discretionary current accruals⁵.

3.3.2. Real earnings management (REM) activities

Firms generally boost their earnings using three kinds of operating activities. (1) They manipulate sales revenue: by offering price discounts or loose credit conditions, firms can increase additional sales or accelerate sales timing. (2) They overproduce to present a low cost of goods sold (COGS), increasing production more than necessary to allocate fixed costs and reduce fixed costs per unit. (3) Finally, they reduce discretionary expenses, such as for research and development (R&D) or advertising (Cohen & Zarowin, 2010). However, REM activities often cause other negative effects on firms. For example, offering price discounts and manipulating sales revenue may lower products' marginal profits and consequently reduce the cash flow of each sales transaction. When products' prices are restored, sales revenue will no longer increase, causing the cash flow from operations (CFO) to decline; excess production could increase inventory holding costs; and the reduction of discretionary expenses such as R&D, advertising, and maintenance costs could reduce the competitiveness and subsequent sales revenue of products.

Hence, this study combines abnormal cash-flow from operations (AbCFO), abnormal production costs (AbProd), and abnormal discretionary expenses (AbDisExp) into an aggregate measure

⁵ This study divided all accrual items by previous assets to eliminate the influence of size factors.

of REM ($REM = AbCFO*(-1)+AbProd + AbDiscExp*(-1))^6$ to estimate a firm's overall REM (Dechow, Kothari, & Watts, 1998; Roychowdhury, 2006). In addition, this study summed up the DCA and the aggregate REM to obtain the TotalEM to capture a firm's overall EM.

The estimation of REM is presented below:

(1) Abnormal cash flow from operations (AbCFO):

As shown in Eq. (8), this study regards normal CFO as the linear function of sales and lagged change in sales, and then estimates the coefficient $\hat{\beta}_j$ of the cross-sectional regression model by year and by industry to estimate the normal level of CFO. The AbCFO is actual operating cash flow minus normal operating cash flow. In this study, all estimation procedures for REM variables are the same as that of accrual-based EM:

$$\frac{CFO_{it}}{Assets_{i,t-1}} = \beta_1 \frac{1}{Assets_{i,t-1}} + \beta_2 \frac{Sales_{i,t}}{Assets_{i,t-1}} + \beta_3 \frac{\Delta Sales_{i,t}}{Assets_{i,t-1}} + \varepsilon_{i,t} \quad (8)$$

where CFO_{it} represents firm i 's cash flow from operations in period t . For the remaining variables, please refer to the DCA estimation descriptions from Eqs. (4)–(7).

(2) Abnormal production costs (AbProd):

This study defines production costs ($Prod_{it}$) as the sum of cost of goods sold ($COGS_{it}$) and the change in inventory (ΔINV_{it}) of the year. COGS is the function of sales revenue ($Sales_{it}$), and ΔINV is the function of the contemporaneous and lagged change in sales ($\Delta Sales_{it}$ and $\Delta Sales_{i,t-1}$), which are estimated through Eqs. (9) and (10), respectively.

$$\frac{COGS_{it}}{Assets_{i,t-1}} = \gamma_1 \frac{1}{Assets_{i,t-1}} + \gamma_2 \frac{Sales_{i,t}}{Assets_{i,t-1}} + \varepsilon_{i,t} \quad (9)$$

$$\frac{\Delta INV_{it}}{Assets_{i,t-1}} = \gamma_1 \frac{1}{Assets_{i,t-1}} + \gamma_2 \frac{\Delta Sales_{i,t}}{Assets_{i,t-1}} + \gamma_3 \frac{\Delta Sales_{i,t-1}}{Assets_{i,t-1}} + \varepsilon_{i,t} \quad (10)$$

Eq. (11) is used to estimate production costs at the normal level and then subtract it from actual production costs to estimate abnormal production costs:

$$\frac{Prod_{it}}{Assets_{i,t-1}} = \gamma_1 \frac{1}{Assets_{i,t-1}} + \gamma_2 \frac{Sales_{i,t}}{Assets_{i,t-1}} + \gamma_3 \frac{\Delta Sales_{i,t}}{Assets_{i,t-1}} + \gamma_4 \frac{\Delta Sales_{i,t-1}}{Assets_{i,t-1}} + \varepsilon_{i,t} \quad (11)$$

In Eq. (11), $Prod_{it}$ represents the production costs of firm i in period t . For the remaining variables, please refer to the DCA estimation descriptions from Eqs. (4)–(7).

(3) Abnormal Discretionary Expense (AbDisExp):

This study considers discretionary expense as the linear combination (Eq. (12)) of previous sales ($Sales_{i,t-1}$) and estimates the

normal discretionary expense. This could prevent managers from manipulating current sales revenue to increase earnings, and lead to low residuals (Roychowdhury, 2006). The study then estimates AbDisExp by subtracting the normal-level discretionary expense from the actual one:

$$\frac{DisExp_{it}}{Assets_{i,t-1}} = \varphi_1 \frac{1}{Assets_{i,t-1}} + \varphi_2 \frac{Sales_{i,t-1}}{Assets_{i,t-1}} + \varepsilon_{i,t} \quad (12)$$

In Eq. (12), $DisExp_{it}$ represents the discretionary expenses of firm i in period t , including R&D, advertising, and SG&A (selling, general and administrative expenses). For the remaining variables, please refer to the DCA estimation descriptions from Eqs. (4)–(7).

3.4. Model specification

This study constructs Eq. (13) using ordinary least squares (OLS) to examine the influence of product market competition and corporate governance mechanisms on EM to verify Hypotheses 1 and 2. Next, the study sorts market power and industry competition based on their size, and then divides them into two groups, respectively. The study then tests whether the relationship between corporate governance and EM has changed in the high and low market power groups as well as in the high and low industry competition groups to verify Hypotheses 3 and 4:

$$REM_{it} \text{ or } TotalEM_{it} = \alpha_0 + \alpha_1 MP_{it} + \alpha_2 HHI_{it} + \sum_{k=1}^9 \beta_k CG_{it} + \sum_{k=1}^5 \gamma_k CV_{it} + \varepsilon_{it} \quad (13)$$

In Eq. (13), REM represents the aggregate real EM. TotalEM represents the sum of DCA and aggregate REM activities. MP represents value-weighted industry-adjusted market power. HHI denotes industry concentration, measured by the industry's mean HHI (Herfindahl-Hirschman Index) value over the past three years. CG refers to corporate governance variables including Board, Duality, BShare, MgrShare, DomeShare, ForeShare, Family, Chair_turnover, and CEO_turnover. Board is the board size. Duality is the CEO duality dummy. Duality is set to 1, if a board chairman is also the CEO; 0, otherwise. BShare is the board shareholding ratio. MgrShare is the managerial ownership. DomeShare is the domestic institutional ownership. ForeShare is the foreign institutional ownership. Family is the family control dummy variable. Family is set to 1, if the ultimate controller of the company consists of a group of people (natural persons) with the same interests and goals, and the group has a kinship relationship; 0 others. Chair_turnover is the turnover rate of board chair in the three years. CEO_turnover is the turnover rate of the CEO in the three years. CV is a control variable, reflecting a set of firm characteristics including Lev, MB, ROA, LagREM (or LagTotalEM), and LnSales. Lev is the debt ratio. MB is the market-to-book ratio. ROA is the return on assets. LagREM is the previous year REM. LagTotalEM is the previous year TotalEM. LnSales is the natural logarithm of net sales.

This study anticipates that firms with low market power are unable to differentiate their products from others, leading to having products with high substitutability and low profitability. Hence, managers are induced to embellish their operating results through EM. Besides, when facing more competitors, firms are more likely to reduce prices, consequently lowering profits. This makes it difficult for managers to achieve their earnings targets. Consequently, they have intensives to employ EM to achieve their financial goals and subsequently safeguard their working rights. Referring Mitra et al. (2013), this study integrates the competition between and within industries by multiplying market power and HHI ($MP*HHI$). We expect that firms with lower market power are difficult to differentiate their products within an industry, leading to higher product

⁶ When a firm engages in income-increasing earnings management through activities such as sales manipulation, excess production, or the reduction of discretionary expenses, it is likely to report low CFO, high production costs, or low discretionary expenses. In the calculation of REM, this study multiplied both CFO and discretionary expenses by -1. A higher REM indicates that a firm engages in more income-increasing earnings management.

substitutability and lower profit margins. The situation becomes even worse if the firm is in a highly competitive industry. In this case, managers have more incentives to employ accrual-based EM or REM to adjust earnings compared to firms with higher market power and in a low competitive industry.

A small board of directors could achieve better decision-making efficiency. On the other hand, a small board is easy to control by inside directors or controlling shareholders, leading to a situation where managers have to take orders from the board. When there are more board seats, mutual supervision and restraints could be effective, enhancing supervision and reducing managers' EM behavior. Therefore, this study expects that the board size (Board) is negatively related to EM. This study does not predict the BShare's relationship with EM, given the mixed results from previous studies. Institutional investors generally possess the abilities and resources to supervise managers' opportunistic behaviors. However, some of these investors tend to emphasize short-term performance, which may further intensify managers' motivation to utilize EM and meet their expectations to pursue short-term performance. Hence, the influence of various institutional investors on EM could differ. This study examines the effect of ForeShare and DomeShare on EM behaviors, and does not predict the direction of the relationships. Furthermore, the higher the board chair turnover is, the less likely it is to supervise management, and the higher the degree of EM will be. Previous studies also found that CEO turnover had a positive relationship with financial restatements (Agrawal & Cooper, 2007). More frequent CEO turnover is likely to indicate problems with a firm's operations or financial conditions, which could create incentives and opportunities to manipulate earnings. Therefore, this study anticipates that the chair turnover rate (Chair_turnover) and CEO turnover rate (CEO_turnover) in the last three years could have a positive relationship with the extent of EM.

This study expects that the competitive environment could influence the effects of corporate governance on EM. Managers of firm with strong market power or in an industry with low competition tend to have no immediate need to manipulate financial statements through EM; hence, most corporate governance mechanisms could still work properly. However, directors, managers, and institutional investors may induce managers of firms with low market power or in a highly competitive industry to employ accrual-based EM or REM to achieve market expectations or reduce financing costs. This could lead to the failure of corporate governance mechanisms. In an environment of high product market competition, if the board chair or CEO changes frequently, managers may be more likely to have opportunities and inducements to manipulate earnings. Therefore, differences in market power and competition environments could explain the inconsistent results seen in corporate governance studies.

In addition, when a firm's debt ratio (Debt) increases, managers may have more incentives to manage earnings in order to meet their debt covenants or avoid a reduction in the credit ratings of corporate bonds (Minton & Schrand, 1999). High-growth firms (MB) have high requirements for funding and are thus induced to reduce their financing costs through EM (Skinner & Sloan, 2002). The higher the ROA, the less necessary it is to manipulate earnings to enhance financial statements. The firms with more previous REM or TotalEM could continue to manipulate earnings in the current period (Tang, 2016). There is also no need for firms enjoying higher sales revenue (LnSales) to embellish their earnings.

4. Empirical findings

4.1. Descriptive statistics

Table 1 reports sample distribution by industry and by year, respectively. This table indicates that the electronics related indus-

Table 1
Industrial and annual sample distribution.

Panel A: Industrial sample distribution				
Industry	Freq.	%	Cumulative Freq.	Cumulative %
Cement	62	0.54	62	0.54
Food	257	2.24	319	2.78
Plastic	278	2.42	597	5.19
Textile	550	4.79	1,147	9.98
Electric machinery	668	5.81	1,815	15.79
Electrical and cable	131	1.14	1,946	16.93
Glass and ceramic	48	0.42	1,994	17.35
Paper and pulp	79	0.69	2,073	18.04
Iron and steel	420	3.65	2,493	21.69
Rubber	110	0.96	2,603	22.65
Automobile	43	0.37	2,646	23.02
Building materials and construction	618	5.38	3,264	28.40
Shipping and transportation	93	0.81	3,357	29.21
Tourism	113	0.98	3,470	30.19
Trading and consumer goods	173	1.51	3,643	31.69
Others	620	5.39	4,263	37.09
Chemical	365	3.18	4,628	40.26
biotechnology, and medical care	402	3.50	5,030	43.76
Oil, gas and utilities	100	0.87	5,130	44.63
Electronics	6,250	54.38	11,380	99.01
Cultural and creative	114	0.99	11,494	100.00

Panel B: Annual sample distribution				
Year	Freq.	%	Cumulative Freq.	Cumulative %
2003	594	5.17	594	5.17
2004	745	6.48	1,339	11.65
2005	831	7.23	2,170	18.88
2006	883	7.68	3,053	26.56
2007	940	8.18	3,993	34.74
2008	986	8.58	4,979	43.32
2009	1,043	9.07	6,022	52.39
2010	1,083	9.42	7,105	61.81
2011	1,118	9.73	8,223	71.54
2012	1,160	10.09	9,383	81.63
2013	1,025	8.92	10,408	90.55
2014	1,086	9.45	11,494	100.00

Panel A and panel B of the table reports sample distribution by industry and by year, respectively.

tries accounts for 54.38 % of the sample. Table 2 presents the descriptive statistics for the variables. This table indicates that the mean and median of both REM and TotalEM are negative, indicating that, on average, most firms did not make upward adjustments in EM. The mean and median of market power (MP) were 0.055 and 0.053, respectively. The minimum was -0.644 and the maximum 0.651. The mean and median of industry competition (HHI) were 0.152 and 0.108, respectively; its minimum value was 0.021 and the maximum 0.879. Hence, on average, most industries are competitive, but there are considerable differences in the degree of competition among industries. In the sample firms, the mean value of board seats (Board) is 6.85, and 32.3 % of CEOs are also the board chair (Duality). The mean board ownership (BShare) is 20.4 %, managerial ownership (MgrShare) is 1.7 %, the ratio of shares held by domestic institutional investors (DomeShare) is 27.5 %, and the ratio of shares held by foreign institutional investors (ForeShare) is 7.4 %. Therefore, domestic institutional investors generally have higher stock ownership than foreign institutional investors. Family-controlled firms account for 62.7 % of the research sample, indicating that most listed firms in Taiwan are still family-controlled. The average board chair turnover rate in the three years is 0.257, the median and minimum value of which are both zero, and the maximum is nine, indicating that on average, board chair turnover among Taiwan's listed firms is not frequent; in some firms, however, turnover frequency is considerably high. Moreover, the average CEO turnover in the three years is 0.466. Its

Table 2
Descriptive statistics.

N = 11494					
Variables	Mean	Median	Std. dev.	Minimum	Maximum
DCA	-0.010	-0.012	0.136	-4.821	5.520
REM	-0.028	-0.024	0.347	-5.307	12.074
TotalEM	-0.039	-0.035	0.400	-4.452	13.576
MP	0.055	0.053	0.128	-0.644	0.651
HHI	0.152	0.108	0.160	0.021	0.879
Board	6.850	7	2.119	2	27
Duality	0.323	0	0.468	0	1
BShare	0.204	0.168	0.131	0	0.878
MgrShare	0.017	0.006	0.027	0	0.392
DomeShare	0.275	0.233	0.190	0	0.980
ForeShare	0.074	0.021	0.121	0	0.772
Family	0.627	1	0.484	0	1
Chair_turnover	0.257	0	0.593	0	9
CEO_turnover	0.466	0	0.769	0	7
Lev	0.418	0.422	0.175	0.006	0.991
MB	1.569	1.233	1.302	0.067	27.654
ROA	0.090	0.085	0.096	-0.754	0.965
LagREM	-0.032	-0.026	0.354	-5.307	12.074
LagTotalEM	-0.042	-0.037	0.407	-4.452	13.576
Sales (millions)	17,647	2,933	89,751	12	3,905,395

This table presents the descriptive statistics for the sample. REM represents the aggregate real EM. TotalEM represents the sum of DCA and aggregate REM activities. MP represents value-weighted industry-adjusted market power. HHI denotes industry concentration, measured by the industry's mean HHI (Herfindahl-Hirschman Index) value over the past three years. Board is the board size. Duality is the CEO duality dummy, which is set to 1, if a board chairman is also the CEO; 0, otherwise. BShare is the board shareholding ratio. MgrShare is the managerial ownership. DomeShare is the domestic institutional ownership. Foreign is the foreign institutional ownership. Family is the family control dummy variable. Family is set to 1, if the ultimate controller of the company consists of a group of people (natural persons) with the same interests and goals, and the group has a kinship relationship; 0 others. Chair_turnover is the turnover rate of board chair in the three years. CEO_turnover is the turnover rate of the CEO in the three years. Lev is the debt ratio. MB is the market-to-book ratio. ROA is the return on assets. LagREM is the previous year REM. TotalEM is the previous year TotalEM. Sales is the net sales revenue.

median and minimum values are zero, and the maximum value is seven, indicating that the average CEO turnover is higher than that of the board chair; in some firms, CEO turnover is considerably high.

Table 3 provides the Pearson correlation of the variables. As is shown, MP is significantly and negatively related to REM and TotalEM (both $p < 0.0001$). This implies that firms with lower market power associate with more earnings management, supporting hypothesis 1. HHI has an insignificant negative relationship with REM, and a significantly negative relationship with TotalEM ($p = 0.0922$), partially supporting hypothesis 2. Board, MgrShare, and ForeShare significantly and negatively correlated with REM and TotalEM, indicating that larger board size, higher management ownership, and more foreign institutional ownership associate with less earnings manipulation. Contrarily, BShare, Family, Chair_turnover and CEO_turnover have a positive and significant relationship with REM and TotalEM, implying that higher board ownership, family-controlled firms, higher turnover rate of board chair and CEO correlated with more financial misreporting.

Columns 1–3 and columns 4–6 in Table 4 present the mean difference tests between high-low MP, and high-low HHI, grouped by the medians of market power and industry competition, respectively.⁷ Columns 1–3 shows that, in the group with high mar-

ket power, the mean values of both REM and TotalEM are negative. However, in the group with low market power, both mean values are positive, and there is a very significant difference in the mean value of the two groups' EM variables. This result implies that firms with high market power do not need to boost their profits through EM activities. However, firms with low market power could embellish their earnings through operating activities. This result supports Hypotheses 1. The firms with high market power have a large board size, as well as high BShare, MgrShare, Domestic Share, and Foreign Share ratios. This indicates that insiders and institutional investors have better professional expertise, and hence own more corporate stocks in firms with high market power. Further, firms with low market power adopt more dual-leadership structures and have a higher board chair turnover and CEO turnover than firms with high market power. This result could imply that, when a firm's market power is weak, it may need to increase its decision-making efficiency through the dual leadership structure. Another explanation may be that the duality structure is subject to less supervision, resulting in poor market power.

As shown in columns 4–6, in the two groups of high and low industry competition, the means of both REM and TotalEM are negative, but there is almost no significant difference between the two. There are significant differences in the corporate governance variables of the two groups, and their results are similar to those of the corporate governance variables in the high and low market power groups. In the group with high industry competition (the group with low HHI), the board size is small, and the firms are likely to adopt a dual-leadership structure (Duality). It means that in a competitive market, a smaller board and dual leadership structure are needed to improve decision-making efficiency. The numbers are low in BShare, DomeShare, and ForeShare, but the frequency of CEO turnover is high. In the group with high industry competition, the MgrShare is higher. This result could imply that, when market competition is high, firms may require managers to hold more shares or offer them many stocks as an incentive to converge their interests with corporate profit. In addition, few family-controlled firms exist in the group.

4.2. Results of regression analysis

Table 5 presents the regression results for the impact of market power and industry competition on firms' EM. It shows that market power presents a significantly negative influence on both REM and TotalEM (both p -value < 0.0001). This result implies that low market power could result in an increasing need for managers to employ accrued items and various operating activities to improve profits, which supports Hypothesis 1. HHI also presents a negative influence on REM and TotalEM (p -value = 0.0929 and 0.075, separately), indicating that when HHI is low—that is, when industry competition is high—it is more necessary for firms to perform income-increasing EM to embellish their financial statements, consistent with Hypothesis 2. Notably, the significance level of HHI coefficient is lower than that of market power on REM and TotalEM. Thus, this study indicates that a firm's weak market power implies poor profitability, or that, when an industry becomes more competitive, managers could be increasingly incentivized to use EM activities for upward adjustment, and that low market power has a stronger incentive on EM than industry competition does.

Table 5 also shows that board size has a significantly negative influence on REM and that ForeShare has a significantly negative influence on TotalEM, indicating that a large board and foreign institutional investors can better monitor managers' EM. BShare ratio has a significantly positive influence on both REM and TotalEM. This result implies that board directors with more ownership are likely to, in pursuing their own self-interests, ignore managers' income-

⁷ For conciseness, this study presents only the empirical results of REM and TotalEM without reporting DCA results, because (1) DCA shows an insignificant negative correlation with MP, HHI, and MP*HHI; (2) there is no significant difference in DCA between the high-low MP and high-low HHI groups. Besides, Mitra et al. (2013) do not find a significant relationship between market power and accrual-based earnings management.

Table 3
Pearson correlation.

	REM	TotalEM	MP	HHI	Board	Duality	BShare	MgrShare	DomeShare	ForeShare	Family	Chair_turnover	CEO_turnover
REM	1.000												
TotalEM	0.944*** (<.0001)	1.000											
MP	−0.291*** (<.0001)	−0.249*** (<.0001)	1.000										
HHI	−0.014 (0.1325)	−0.016 (0.0922)*	0.006 (0.5546)	1.000									
Board	−0.031*** (0.0009)	−0.028*** (0.0032)	0.035*** (0.0002)	0.084*** (<.0001)	1.000								
Duality	0.003 (0.7647)	0.004 (0.6729)	−0.042*** (<.0001)	−0.026*** (0.0049)	−0.157*** (<.0001)	1.000							
BShare	0.024*** (0.0093)	0.018* (0.0509)	0.015 (0.1198)	0.095*** (<.0001)	0.123*** (<.0001)	−0.073*** (<.0001)	1.000						
MgrShare	−0.028*** (0.0025)	−0.021** (0.0279)	0.036*** (0.0001)	−0.082*** (<.0001)	−0.036*** (0.0001)	−0.028*** (0.0028)	−0.030*** (0.0012)	1.000					
DomeShare	0.010 (0.2691)	0.009 (0.3466)	0.110*** (<.0001)	0.085*** (<.0001)	0.160*** (<.0001)	−0.133*** (<.0001)	0.436*** (<.0001)	−0.163*** (<.0001)	1.000				
ForeShare	−0.086*** (<.0001)	−0.086*** (<.0001)	0.152*** (<.0001)	0.022** (0.0208)	0.192*** (<.0001)	−0.054*** (<.0001)	0.001 (0.8851)	−0.089*** (<.0001)	−0.047*** (<.0001)	1.000			
Family	0.022** (0.0188)	0.021** (0.0218)	−0.002 (0.8205)	0.070*** (<.0001)	−0.104*** (<.0001)	0.026*** (0.0058)	0.013 (0.1659)	−0.167*** (<.0001)	0.016*** (0.0882)	−0.082*** (<.0001)	1.000		
Chair_turnover	0.093*** (<.0001)	0.091*** (<.0001)	−0.130*** (<.0001)	−0.011 (0.2432)	0.030*** (0.0015)	−0.005 (0.5618)	0.091*** (<.0001)	−0.039*** (<.0001)	0.129*** (<.0001)	−0.036*** (<.0001)	−0.060*** (<.0001)	1.000	
CEO_turnover	0.088*** (<.0001)	0.081*** (<.0001)	−0.136*** (<.0001)	−0.031*** (0.0008)	0.005*** (0.6080)	−0.064*** (<.0001)	0.044*** (<.0001)	−0.061*** (<.0001)	0.053*** (<.0001)	−0.034*** (0.0003)	−0.023** (0.0134)	0.375*** (<.0001)	1.000

This table reports the Pearson correlation analysis. REM represents the aggregate real EM. TotalEM represents the sum of DCA and aggregate REM activities. MP represents value-weighted industry-adjusted market power. HHI denotes industry concentration, measured by the industry's mean HHI (Herfindahl-Hirschman Index) value over the past three years. Board is the board size. Duality is the CEO duality dummy, which is set to 1, if a board chairman is also the CEO; 0, otherwise. BShare is the board shareholding ratio. MgrShare is the managerial ownership. DomeShare is the domestic institutional ownership. Foreign is the foreign institutional ownership. Family is the family control dummy variable. Family is set to 1, if the ultimate controller of the company consists of a group of people (natural persons) with the same interests and goals, and the group has a kinship relationship; 0 others. Chair_turnover is the turnover rate of board chair in the three years. CEO_turnover is the turnover rate of the CEO in the three years. p-values are in parentheses. ***, ** and * denote significance at the 1 %, 5 %, and 10 % levels, respectively.

Table 4
Mean difference tests.

Variables	High MP (N = 5836)	Low MP (N = 5658)	t-value	High HHI (Low Comp.) (N = 5814)	Low HHI (High Comp.) (N = 5680)	t-value
	Mean	Mean		Mean	Mean	
REM	-0.12	0.07	-31.27***	-0.02	-0.03	1.89*
TotalEM	-0.13	0.06	-26.51***	-0.03	-0.04	1.63
Board	6.90	6.80	2.57***	7.01	6.68	8.36***
Duality	0.31	0.33	-1.96**	0.31	0.34	-4.12***
BShare	0.21	0.20	1.85*	0.21	0.19	7.62***
MgrShare	0.02	0.02	2.21**	0.01	0.02	-9.19***
DomeShare	0.29	0.26	10.92***	0.29	0.26	6.77***
ForeShare	0.09	0.06	13.07***	0.08	0.07	4.06***
Family	0.63	0.62	1.16	0.65	0.60	5.60***
Chair_turnover	0.21	0.31	-9.14***	0.26	0.25	0.65
CEO_turnover	0.38	0.56	-12.21***	0.45	0.49	-2.78**
Lev	0.38	0.46	-25.76***	0.43	0.41	6.57***
MB	1.91	1.21	30.03***	1.52	1.62	-4.45***
ROA	0.15	0.03	81.43***	0.09	0.09	-2.79***
LagREM	-0.11	0.05	-25.61***	-0.03	-0.04	1.78*
LagTotalEM	-0.12	0.04	-21.59***	-0.04	-0.05	1.11
LnSales	15.11	15.01	3.55***	15.23	14.89	11.92***

Table 4 present the mean difference tests between high-low MP, and high-low HHI, grouped by the medians of market power and industry competition, respectively. REM represents the aggregate real EM. TotalEM represents the sum of DCA and aggregate REM activities. MP represents value-weighted industry-adjusted market power. HHI denotes industry concentration, measured by the industry's mean HHI (Herfindahl-Hirschman Index) value over the past three years. Board is the board size. Duality is the CEO duality dummy. Duality is set to 1, if a board chairman is also the CEO; 0, otherwise. BShare is the board shareholding ratio. MgrShare is the managerial ownership. DomeShare is the domestic institutional ownership. Foreign is the foreign institutional ownership. Family is the family control dummy variable. Family is set to 1, if the ultimate controller of the company consists of a group of people (natural persons) with the same interests and goals, and the group has a kinship relationship; 0 others. Chair_turnover is the turnover rate of board chair in the three years. CEO_turnover is the turnover rate of the CEO in the three years. Lev is the debt ratio. MB is the market-to-book ratio. ROA is the return on assets. LagREM is the previous year REM. TotalEM is the previous year TotalEM. LnSales is the natural logarithm of net sales. ***, ** and * denote significance at the 1%, 5%, and 10% levels, respectively.

increasing EM, which consists with the entrenchment hypothesis. Both board chair and CEO turnover rate present a very significantly positive influence on EM. Thus, when the turnover of the board chair and CEO becomes frequent, the newly appointed board chairs are difficult to control and supervise their firms' operating activities, resulting in more opportunities for managers to perform earnings manipulation. On the other hand, in firms with frequent CEO turnover, the newly appointed CEOs could also be incentivized to employ various EM activities to improve corporate profit growth.

Moreover, the firms with high debt ratio are more likely to employ EM to comply with debt covenants. The firms with low market-to-book ratio (MB) indicate that their firm values are undervalued, and hence they are likely to enhance financial statements through EM. The firms with worse ROA could have more incentives to present better earnings with the help of various operating activities. The firms with more previous REM and TotalEM activities could continue to adjust their earnings through various operating activities and discretionary current accruals.

Table 6 presents the regression results classified by median value of market power. It tests whether the effect of corporate governance on EM is different for the high and low market power groups. The dependent variables are the aggregate REM and TotalEM, respectively. The effect of corporate governance variables on REM and TotalEM are consistent. In subsequent sections of the study, EM will be used to represent REM and TotalEM to simplify the description of the empirical findings. Table 6 shows that there is a significant difference between corporate governance and EM in the high and low market power groups. In the high market power group, board size has no significant influence on EM; in the low market power group, there is a significantly negative influence on EM. This result indicates that, when market power is high, there is less need to embellish financial statements through EM. Therefore, board size has no significant influence on the effect of EM. However, when market power is low, the increase in board seats could reduce EM. In the subsamples with high market power, BShare has a significantly positive influence on EM. This result indicates that, when market power is high, directors holding more shares could

self-interestedly present better financial results, leading to more EM activities for upward adjustment.

In the high market power groups, the MgrShare and DomeShare show an insignificant negative relationship with EM; whereas, in the low market power groups, both have a significantly positive influence on EM. This result implies that, when market power is high, there is less need to window-dress financial earnings. On the contrary, when a firm's market power is weak and managers have higher ownership, managers are induced to manipulate earnings for their self-interests. Meanwhile, higher domestic institutional ownership could also encourage manager's earnings management incentives to satisfy domestic institutional investors' expectations for corporate profits. Therefore, for firms with low market power, increasing DomeShare has no supervisory effect, but instead could intensify managers' earnings manipulation behaviors. This reflects the phenomenon of the close relationship between domestic institutional investors and corporate managers. In the subsamples with high market power, the ForeShare presents a significantly negative influence on EM, indicating that, for firms with strong market power, foreign institutional investors have better supervision over managers' earnings manipulation. It is worth noting that, regardless of whether the market power is high or low, the frequent change (turnover) of the board chair could result in an ineffective supervision of managers and consequently a higher extent of EM. If a firm has low market power and its CEO turnover is frequent, it is more likely to induce CEO's EM behavior to achieve better performance. Thus, the abovementioned results support Hypothesis 3.

Table 7 shows the regression results classified by the median value of industry competition. It tests whether the effect of corporate governance on EM is different for the high and low industry competition groups. The first and third columns represent the results for the low competition group (high HHI), while the second and fourth columns represent those for the high competition group (low HHI). As shown, in the group with low industry competition, board size has a significantly negative influence on EM. However, in the group with high industry competition, there is

Table 5
Regression analysis results of the entire sample.

Variables	Expected sign	REM (N = 11494)	TotalEM (N = 11494)
Intercept	?	-0.100*** (-2.78)	-0.094** (-2.18)
MP	-	-0.268*** (-8.03)	-0.318*** (-7.91)
HHI	-	-0.030* (-1.68)	-0.039* (-1.78)
Board	-	-0.003* (-1.71)	-0.002 (-1.13)
Duality	+	-0.002 (-0.34)	-0.001 (-0.08)
BShare	+/-	0.082*** (3.29)	0.075** (2.49)
MgrShare	+/-	0.022 (0.20)	0.059 (0.45)
DomeShare	+	0.009 (0.47)	0.012 (0.53)
ForeShare	-	-0.045 (-1.59)	-0.074** (-2.17)
Family	+	0.004 (0.60)	0.006 (0.79)
Chair_turnover	+	0.019*** (3.62)	0.029*** (4.53)
CEO_turnover	+	0.008** (2.03)	0.009* (1.95)
Lev	+	0.258*** (13.46)	0.302*** (13.16)
MB	-	-0.012*** (-4.93)	-0.017*** (-5.9)
ROA	-	-0.390*** (-8.01)	-0.284*** (-4.87)
LagREM/LagTotalEM	+	0.288*** (33.45)	0.226*** (25.58)
LnSales	+/-	0.002 (0.94)	0.000 (-0.02)
Adj. R ²		0.226	0.160
F-value		211.22***	138.182***

This table presents the regression results for the impact of market power and industry competition on firms' earnings management. REM represents the aggregate real EM. TotalEM represents the sum of DCA and aggregate REM activities. MP represents value-weighted industry-adjusted market power. HHI denotes industry concentration, measured by the industry's mean HHI (Herfindahl-Hirschman Index) value over the past three years. Board is the board size. Duality is the CEO duality dummy. Duality is set to 1, if a board chairman is also the CEO; 0, otherwise. BShare is the board shareholding ratio. MgrShare is the managerial ownership. DomeShare is the domestic institutional ownership. Foreign is the foreign institutional ownership. Family is the family control dummy variable. Family is set to 1, if the ultimate controller of the company consists of a group of people (natural persons) with the same interests and goals, and the group has a kinship relationship; 0 others. Chair_turnover is the turnover rate of board chair in the three years. CEO_turnover is the turnover rate of the CEO in the three years. Lev is the debt ratio. MB is the market-to-book ratio. ROA is the return on assets. LagREM is the previous year REM. TotalEM is the previous year TotalEM. LnSales is the natural logarithm of net sales. t-statistics are in parentheses. ***, ** and * denote significance at the 1%, 5%, and 10% levels, respectively.

no significant correlation between board size and EM, indicating that, only when industry competition is low, a large board could have a supervisory effect on EM. In the samples with high industry competition, the BShare as well as the board chair and CEO turnover rate have a significantly positive influence on EM. The result indicates that firms in highly competitive industries find it difficult to make a profit. Based on the self-interest motivation of both the board and management, the increased BShare could induce more EM activities to present a better financial condition. Meanwhile, in a competitive industry, high board chair and CEO turnover will make it difficult for the newly appointed board chair to effectively supervise managers, and consequently, could even intensify managers' incentives to employ EM. Notably, the ForeShare and EM presented a significantly negative relationship in a competitive industry. That is, in a less competitive market,

Table 6
Regression analysis results of the market power group.

	REM		TotalEM	
	High MP (N = 5836)	Low MP (N = 5658)	High MP (N = 5836)	Low MP (N = 5658)
Intercept	-0.089* (-1.67)	0.048 (0.97)	-0.091 (-1.48)	0.071 (1.15)
Board	0.000 (0.20)	-0.004* (-1.88)	0.001 (0.59)	-0.005* (-1.91)
Duality	-0.007 (-0.82)	0.008 (0.91)	-0.009 (-0.94)	0.012 (1.09)
BShare	0.110*** (3.25)	-0.005 (-0.13)	0.101*** (2.57)	-0.009 (-0.19)
MgrShare	-0.199 (-1.36)	0.308* (1.95)	-0.138 (-0.81)	0.386* (1.95)
DomeShare	-0.020 (-0.82)	0.063** (2.36)	-0.015 (-0.54)	0.058* (1.75)
ForeShare	-0.073** (-2.03)	0.048 (1.06)	-0.111*** (-2.67)	0.044 (0.78)
Family	0.005 (0.57)	-0.002 (-0.23)	0.005 (0.52)	-0.001 (-0.08)
Chair_turnover	0.023*** (2.84)	0.019*** (2.69)	0.034*** (3.58)	0.028*** (3.28)
CEO_turnover	-0.001 (-0.17)	0.019*** (3.54)	-0.003 (-0.36)	0.022*** (3.33)
Lev	0.365*** (12.75)	0.145*** (5.63)	0.418*** (12.69)	0.175*** (5.45)
MB	-0.004 (-1.28)	0.001 (0.18)	-0.006 (-1.54)	-0.003 (-0.62)
ROA	-0.936*** (-14.06)	-0.015 (-0.26)	-0.913*** (-11.85)	0.143* (1.95)
LagREM/LagTotalEM	0.213*** (20.70)	0.398*** (25.95)	0.186*** (18.03)	0.264*** (16.6)
LnSales	-0.001 (-0.29)	-0.005 (-1.47)	-0.003 (-0.75)	-0.008* (-1.75)
Adj. R ²	0.226	0.132	0.188	0.063
F-value	122.82***	62.24***	97.41***	28.34***

This table reports the regression results classified by median value of market power. REM represents the aggregate real EM. TotalEM represents the sum of DCA and aggregate REM activities. MP represents value-weighted industry-adjusted market power. HHI denotes industry concentration, measured by the industry's mean HHI (Herfindahl-Hirschman Index) value over the past three years. Board is the board size. Duality is the CEO duality dummy. Duality is set to 1, if a board chairman is also the CEO; 0, otherwise. BShare is the board shareholding ratio. MgrShare is the managerial ownership. DomeShare is the domestic institutional ownership. Foreign is the foreign institutional ownership. Family is the family control dummy variable. Family is set to 1, if the ultimate controller of the company consists of a group of people (natural persons) with the same interests and goals, and the group has a kinship relationship; 0 others. Chair_turnover is the turnover rate of board chair in the three years. CEO_turnover is the turnover rate of the CEO in the three years. Lev is the debt ratio. MB is the market-to-book ratio. ROA is the return on assets. LagREM is the previous year REM. TotalEM is the previous year TotalEM. LnSales is the natural logarithm of net sales. t-statistics are in parentheses. ***, ** and * denote significance at the 1%, 5%, and 10% levels, respectively.

foreign ownership does not affect firms' earnings management; whereas, in a competitive market, increased foreign ownership can effectively reduce management earnings manipulation. This indicates that foreign institution investors have better supervision effect on earnings management than other institutions in the high competition industry. Although the effect of some corporate governance variables on EM in Tables 6 and 7 seems inconsistent, the reason could be due to the different properties between market power and industry competition. Industry competition is an industry-level measure for the competition among firms. Firm market power is a firm-level measure for the power to compete with external competition. Thus, the above results support Hypothesis 4.

To investigate the interaction effect of market power and industry competition on the corporate governance-EM relationship, this study further multiplies the market power of the sample firms with their HHI (the higher the HHI, the lower the industry competition), and then divides the sample into high and low groups based on the

Table 7
Regression analysis results of the industry competition group.

	REM		TotalEM	
	High HHI (Low Comp.) (N = 5814)	Low HHI (High Comp.) (N = 5680)	High HHI (Low Comp.) (N = 5814)	Low HHI (High Comp.) (N = 5680)
Intercept	-0.130*** (-3.63)	-0.017 (-0.25)	-0.149*** (-3.22)	0.002 (0.03)
Board	-0.004*** (-3.08)	0.000 (0.03)	-0.004** (-2.42)	0.001 (0.30)
Duality	-0.008 (-1.19)	0.004 (0.34)	-0.006 (-0.74)	0.004 (0.35)
BShare	0.038 (1.53)	0.129*** (2.84)	0.049 (1.56)	0.115** (2.15)
MgrShare	0.093 (0.81)	-0.068 (-0.37)	0.150 (1.01)	-0.043 (-0.20)
DomeShare	0.008 (0.44)	0.001 (0.04)	-0.004 (-0.17)	0.017 (0.47)
ForeShare	0.033 (1.14)	-0.106** (-2.19)	-0.020 (-0.52)	-0.123*** (-2.16)
Family	-0.003 (-0.41)	-0.002 (-0.18)	0.001 (0.11)	-0.002 (-0.17)
Chair_turnover	0.008 (1.59)	0.032*** (3.41)	0.019*** (2.80)	0.044*** (3.96)
CEO_turnover	0.005 (1.19)	0.012* (1.77)	0.003 (0.49)	0.019** (2.35)
Lev	0.125*** (6.28)	0.393*** (12.05)	0.193*** (7.56)	0.432*** (11.28)
MB	-0.012*** (-4.8)	-0.009** (-2.21)	-0.022*** (-6.66)	-0.010** (-2.03)
ROA	-0.49*** (-12.67)	-0.672*** (-11.1)	-0.497*** (-9.90)	-0.629*** (-8.85)
LagREM/LagTotalEM	0.505*** (39.24)	0.219*** (18.41)	0.325*** (24.47)	0.187*** (15.18)
LnSales	0.010*** (3.63)	-0.008* (-1.79)	0.009*** (2.67)	-0.012** (-2.27)
Adj. R ²	0.343	0.190	0.199	0.145
F-value	218.04***	95.83***	104.37***	69.84***

This table shows the regression results classified by the median value of industry competition. REM represents the aggregate real EM. TotalEM represents the sum of DCA and aggregate REM activities. MP represents value-weighted industry-adjusted market power. HHI denotes industry concentration, measured by the industry's mean HHI (Herfindahl-Hirschman Index) value over the past three years. Board is the board size. Duality is the CEO duality dummy. Duality is set to 1, if a board chairman is also the CEO; 0, otherwise. BShare is the board shareholding ratio. MgrShare is the managerial ownership. DomeShare is the domestic institutional ownership. Foreign is the foreign institutional ownership. Family is the family control dummy variable. Family is set to 1, if the ultimate controller of the company consists of a group of people (natural persons) with the same interests and goals, and the group has a kinship relationship; 0 others. Chair_turnover is the turnover rate of board chair in the three years. CEO_turnover is the turnover rate of the CEO in the three years. Lev is the debt ratio. MB is the market-to-book ratio. ROA is the return on assets. LagREM is the previous year REM. TotalEM is the previous year TotalEM. LnSales is the natural logarithm of net sales. t-statistics are in parentheses. ***, ** and * denote significance at the 1%, 5%, and 10% levels, respectively.

median values, as shown in Table 8. This allows the study to identify, more clearly than can be done by considering market power or HHI alone. The groups in the first and third columns (those with high MP*HHI) represent the samples with high market power and low industry competition. In these groups, there is no need for managers to embellish their financial statements through EM. The groups in the second and fourth columns (those with low MP*HHI) represent the samples with low market power and high industry competition. In these groups, managers have a more pressing need to employ EM to show higher profits.

Compared with the other relationships between corporate governance and EM in Tables 6 and 7, the relationships among MgrShare, DomeShare, and EM in Table 8 display even more significant differences between the two groups. In the group with a high interaction value of market power and industry competition (the group with high MP*HHI), both MgrShare (managerial own-

Table 8
Regression analysis of the interaction between market power and industry competition.

	REM		TotalEM	
	High MP*HHI (N = 5680)	Low MP*HHI (N = 5814)	High MP*HHI (N = 5680)	Low MP*HHI (N = 5814)
Intercept	-0.118** (-2.30)	-0.008 (-0.16)	-0.120* (-2.03)	0.009 (0.15)
Board	-0.001 (-0.42)	-0.004* (-1.75)	0.000 (-0.08)	-0.004 (-1.30)
Duality	-0.011 (-1.29)	0.007 (0.80)	-0.013 (-1.27)	0.012 (1.05)
BShare	0.120*** (3.68)	0.029 (0.76)	0.116*** (3.09)	0.019 (0.39)
MgrShare	-0.411*** (-2.72)	0.403*** (2.58)	-0.384** (-2.21)	0.479** (2.45)
DomeShare	-0.042* (-1.77)	0.080*** (2.95)	-0.043 (-1.55)	0.084** (2.49)
ForeShare	-0.078** (-2.14)	0.027 (0.60)	-0.125*** (-2.98)	0.034 (0.60)
Family	0.007 (0.83)	-0.003 (-0.39)	0.009 (0.99)	-0.004 (-0.39)
Chair_turnover	0.019** (2.55)	0.024*** (3.30)	0.030*** (3.67)	0.032*** (3.54)
CEO_turnover	-0.005 (-0.77)	0.020*** (3.59)	-0.004 (-0.58)	0.021*** (3.14)
Lev	0.314*** (11.24)	0.018*** (6.82)	0.375*** (11.71)	0.205*** (6.24)
MB	-0.006* (-1.80)	-0.001 (-0.25)	-0.010** (-2.37)	-0.004 (-0.86)
ROA	-0.874*** (-13.41)	-0.186*** (-3.38)	-0.853*** (-11.39)	-0.067 (-0.98)
LagREM/LagTotalEM	0.240*** (23.22)	0.361*** (23.48)	0.193*** (19.28)	0.269*** (15.99)
LnSales	0.003 (0.84)	-0.003 (-0.85)	0.001 (0.20)	-0.006 (-1.29)
Adj. R ²	0.242	0.129	0.197	0.068
F-value	133.55***	61.03***	103.30***	30.71***

This table reports the regression results classified by median value of multiply market power by HHI. REM represents the aggregate real EM. TotalEM represents the sum of DCA and aggregate REM activities. MP represents value-weighted industry-adjusted market power. HHI denotes industry concentration, measured by the industry's mean HHI (Herfindahl-Hirschman Index) value over the past three years. Board is the board size. Duality is the CEO duality dummy. Duality is set to 1, if a board chairman is also the CEO; 0, otherwise. BShare is the board shareholding ratio. MgrShare is the managerial ownership. DomeShare is the domestic institutional ownership. Foreign is the foreign institutional ownership. Family is the family control dummy variable. Family is set to 1, if the ultimate controller of the company consists of a group of people (natural persons) with the same interests and goals, and the group has a kinship relationship; 0 others. Chair_turnover is the turnover rate of board chair in the three years. CEO_turnover is the turnover rate of the CEO in the three years. Lev is the debt ratio. MB is the market-to-book ratio. ROA is the return on assets. LagREM is the previous year REM. TotalEM is the previous year TotalEM. LnSales is the natural logarithm of net sales. t-statistics are in parentheses. ***, ** and * denote significance at the 1%, 5%, and 10% levels, respectively.

ership) and DomeShare have a significantly negative influence on EM. Conversely, in the group with a low interaction value (the group with low MP*HHI), both ratios have a significantly positive influence on EM. This result indicates that, when market power is high and industry competition is low, managers do not need to adjust their operating results via EM; hence, an increase in MgrShare and DomeShare could reduce the extent of EM. However, when market power is weak and industry competition is high, managers face tremendous operational pressure. To maintain their position and pursue their own interests, they may be induced to manipulate EM to show higher profits.

Moreover, in contrast to foreign institutional investors, domestic institutional investors generally have no supervisory effects, particularly when market power is weak and industrial competition is fierce. This could in turn intensify managers' earnings manipulation incentives to achieve the expectations of domestic

institutional investors. Further, domestic institutional investors, to protect their own investment returns, could ignore managers' earnings manipulation behavior. In both the high and low MP*HHI groups, chair turnover rate has a significant positive impact on REM and TotalEM. This indicates that when the board chair changes frequently, it is difficult to effectively supervise the manager's use of earnings management to increase profitability regardless of market power and competitive environment. In the high MP*HHI group, the CEO turnover rate has no significant effect on REM and TotalEM; whereas, in the low MP*HHI group, the CEO turnover rate shows a significant and positive impact on both REM and TotalEM. This suggests that when the firm's market power is low and the industry competition is fierce, the newly appointed CEO is very likely to window-dress financial reports through the accrued basis and real operating activities for better profitability. Overall, these findings consist with Hypothesis 5 and provide further support for Hypotheses 3 and 4.

5. Conclusions

Several previous studies have explored how corporate governance affects EM. However, these studies have often reported inconsistent results, likely because market power and industry competition may be important factors influencing the effect of corporate governance on EM. Therefore, this study examines the influence of market power and industry competition on the relationship between corporate governance and EM. The findings indicate that, for the subsamples with different levels of product market competition, the relationship between corporate governance variables and EM presented significant differences. The results of regression analysis show that, for the subsamples with weak market power or severe industry competition, corporate governance mechanisms are likely to fail, and even induce managers to employ EM. In other words, the pressure from poor market power and intense market competition could not only reduce the effect of corporate governance on EM but could also increase EM and reduce the reliability of the firm's financial information. Among firms with weak market power and that face high industry competition, corporate governance mechanisms are found to fail and even increase EM, particularly when the interaction effect of market power and industry competition is considered. Thus, this study not only fills a gap in the related research but also helps investors and regulatory institutions understand the impact of firm market power and market competition on the effect of corporate governance on a firm's EM behavior. Furthermore, our results can help ensure the faithful representation of financial statements, reduce the information asymmetry between investors and firms, and enhance the integrity of financial markets.

Our results have significant managerial implications as follows. Because low market power and highly competitive industries will increase the motivation of managerial EM, firms faced with intense market competition should strengthen corporate governance to enhance financial reporting quality and endeavor to increase firm market power to reduce the incentives for EM. Market regulators can impose different levels of supervision and auditing regulations regarding EM on firms with different market power and facing intense industry competition to prevent firms from distorting their operating results through accounting discretions and real operating activities.

This study uses the sample of Taiwanese listed firms to discuss how firm market power and industry competition affect the relationship between corporate governance and EM. Because Taiwanese firms are characterized by weak corporate governance and with low external takeover threat, future research may employ the sample of a market with high takeover threat to compare the results with those of the Taiwan market. In addition, EM often occurs when

firms issue securities, for example, initial public offerings (IPOs) as well as seasoned equity offerings (SEOs), and mergers and acquisitions (M&As). Future studies can also use IPOs, SEOs, or M&As to investigate the influence of firm market power and industry competition on the relationship between corporate governance and managerial EM.

Declaration of Competing Interest

The authors report no conflicts of interest.

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