



Do Female Chief Financial Officers and Female Directors Cooperate? Evidence from Investment Efficiency

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Abstract

Purpose

This paper examines whether the cooperation between female chief financial officers (CFO) and the proportion of female directors would impact investment efficiency. The investigation is grounded in the increasing number of female top managers globally and the notion that female tend to cooperate more with other female than with male.

Methodology

This study utilises publicly listed firms in Bursa Malaysia from 2016 to 2020, which yielded a sample of 2,022 firm-year observations. We used multivariate ordinary least square regression to test the relationship, and to correct for the selection bias, the Heckman selection and propensity score matching (PSM) test were employed.

Findings

We find a positive relationship between female CFOs and investment efficiency. A higher proportion of female directors accentuates this result. The findings support the homophily argument that similar characteristics (gender) promote cooperation. This shows that cooperation between female CFOs and directors improves investment efficiency. The results suggest that the improvement in investment efficiency could relate to higher managerial discretion for female CFOs and their ability to collaborate with female directors. These results are robust to a series of additional and endogeneity tests. Our findings have important implications for policymakers and firms to encourage more appointments of females in top management positions.

Originality

By highlighting the cooperation between female CFOs and female directors, this study contributes to the understanding that cooperation among females improves investment efficiency.

Keywords: female CFOs, investment efficiency, directors' interaction, homophily, Malaysia

JEL codes: G11, G40, G30, J10, J16, M41

1.0 Introduction

Although chief financial officers (CFOs) are considered second in importance to chief executive officers (CEOs), they are key architects in strategic decision-making and incorporating critical financial information into the discussion (Ham *et al.*, 2017; Firk *et al.*, 2019). Moreover, CFOs' primary responsibilities include determining where and how to invest an organisation's resources (Chava & Purnanadam, 2010; Huang & Kisgen, 2013). Hence, they are considered to play a crucial role in advising and guiding the CEO and the board regarding corporate investment decisions (Ferris & Sainani, 2021; Liu *et al.*, 2021; Liu *et al.*, 2022).

Further, managers' personal risk preferences can be reflected in corporate investment decisions (Huang & Kisgen, 2013; Lai *et al.*, 2018; Hurley & Choudhary, 2020).¹ For instance, overconfident managers are more prone to overestimate the future returns of their investment projects, underestimate the likelihood of failure, and consequently increase the likelihood of investment inefficiency (Malmendier & Tate, 2005; He *et al.*, 2019; Kang *et al.*, 2022;). Therefore, we factor in gender because managers' personal risk preferences are also influenced by gender (Croson & Gneezy, 2009). Previous studies show that females tend to exhibit higher risk aversion than males. This behaviour is intensified when females face uncertain situations, view risky ventures as a threat, and seek to avoid adverse outcomes, while males perceive risky ventures as challenging (Larkin & Pines, 2003; Croson & Gneezy, 2009).

Studies of corporate policy show that female CFOs tend to be more risk-averse and conservative than male CFOs, which results in them making different corporate decisions. For instance, female CFOs reduce cash holdings in firms with excess cash (Doan & Iskandar-Datta, 2020), decrease leverage (Schopohl *et al.*, 2021), prudence in expansion decisions in high-growth industries (Han *et al.*, 2022) and receive lower loan prices and more favourable contract terms (Francis *et al.*, 2013). However, in the context of investment efficiency, there is limited evidence on the effect of female CFOs. Gupta *et al.* (2020) and Udhe *et al.* (2017) argue that

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3 the limited focus is due to the perception that the CFO has a lower profile in the firm than the
4 CEO.² As such, more studies are needed to provide a better and more nuanced understanding
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6 of the effect of CFOs' gender on investment efficiency, considering that managerial risk
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8 preferences are shaped by gender. Therefore, our first objective is to investigate the effect of
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10 female CFOs on investment efficiency.
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14 Globally, females account for 28 percent of CEO positions, 38 percent of CFO positions
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16 (Grant Thornton, 2023) and 19.7 percent of the board of directors (Deloitte, 2022).³ As an
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18 increasing number of females hold top management and board positions, it raises an important
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20 question on how their cooperation could influence corporate investment. Notably, previous
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22 studies have examined the impact of females in various leadership positions (directors, CEOs
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24 and CFOs) on investment efficiency in isolation (see Ullah *et al.*, 2020b; Saleh & Sun, 2021;
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26 Liu *et al.*, 2022). Therefore, we extend the current literature by investigating gender interaction
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28 and whether the positive relationship between female CFOs and investment efficiency is
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30 accentuated by the representation of female directors on the board.
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35 Extant literature put forth several arguments on how such cooperation affects corporate
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37 outcomes. The outcomes of such cooperation depend on factors such as social and cultural
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39 impact (Balliet *et al.*, 2011), gender stereotype (Kim, 2015), gender spillover (Kunze & Miller,
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41 2017), homophily (McPherson *et al.*, 2001) and risk aversion and trust (Irwin *et al.*, 2015).⁴
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43 The underlying theoretical argument for our paper is the homophily argument (McPherson *et*
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45 *al.*, 2001), which states the preferential interaction due to similar characteristics to themselves.
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47 These similarities include age, education, ethnicity, religion, and gender (McPherson *et al.*,
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49 2001). Based on the homophily conjecture, one would expect that the level of interactions
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51 would depend on the similarities of characteristics between two parties and, in our case, gender.
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54 We extend the above by incorporating behavioural economic literature that contends
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56 female executives tend to cooperate more with female than male executives (Eckel &
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Grossman, 2001; Greig & Bohnet, 2009; Kunze & Miller, 2017). Based on the gender spillover argument, Kunze and Miller (2017) suggest that the interactions between the same gender could vary either positively or negatively. Kunze and Miller (2017) argue that competition among female workers could increase their performance and the organisation's efficiency. Alternatively, Kunze and Miller (2017) state that female workers could view other females as competing due to response to tokenism in the workplace, which could decrease the firms' efficiency as they are unwilling to cooperate.

Such interaction could negatively impact the firms if females are subject to negative gender spillover (Kunze & Miller, 2017) and risk aversion and trust (Irwin *et al.*, 2015). For instance, if females feel their closest competitors for promotion are other females, they may be less cooperative with each other than men (Kunze & Miller, 2017). Subsequently, Xing *et al.* (2021) show the cooperation among female executives (CEOs and CFOs) and female directors is stronger when they are under pressure to perform. Moreover, the presence of female directors encourages information exchange between them and female executives (Amore *et al.*, 2014). It increases the self-esteem of female executives, as their voices are now being heard than in a male-dominated board (Koenig *et al.*, 2011), contributing to better decision outcomes. In light of the dynamic relationship between the CFO and board directors, we argue that the same effect could occur when gender similarity exists (i.e. there is a female CFO and female directors on the board) to influence the nature of interactions.

Several factors drive our motivation. First, our study is related to, yet significantly distinct from, Xing *et al.* (2021), which investigated firm performance as we explore the impact of female CFOs and their cooperation with female directors on investment efficiency. Investment efficiency will provide an extended understanding of female CFOs' decision-making capabilities, as investment efficiency reflects managers' personal risk preferences. Second, the investigation of the impact of their interaction is driven by McPherson *et al.* (2001),

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3 who discussed the impact of similarity or homophily in decision-making. Third, emerging
4 markets suffer from a lack of efficient investment (Sussangkarn *et al.*, 2011). Hence, the
5 increasing number of female CFOs and female directors in Malaysia for the past decade could
6 improve investment efficiency. Fourth, the existing gender interaction research primarily relies
7 on lab and experimental-based in nature (Schei & Rognes, 2019). As a result, our
8 comprehensive analysis based on archival data serves as empirical evidence.
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17 Malaysia provides a unique setting to examine this issue for at least four reasons. First,
18 the increased number of female CFOs and directors in the past decade provides an opportunity
19 to examine the impact of their interaction on investment efficiency. The Malaysian listed firms
20 are required to fill at least 30 percent of their boards and senior management positions with
21 females by 2016, announced by the then Prime Minister, Najib Razak (Ministry of Women,
22 Family, and Community Development, 2011). This is evident as female representation in the
23 top 100 publicly listed firms increased steadily from 14 percent in 2015 to 30.6 percent in
24 2023.⁵ We view this research as timely, as it captures the relative impact of females'
25 participation in the capital market.
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38 Second, we view this research as an attempt to address the traditional attitudes toward
39 gender roles in Malaysia, where females are often linked with family matters rather than careers
40 (Hirschman, 2016). Third, little empirical evidence provides policymakers with the necessary
41 information on whether females in top management and on boards have impacted corporate
42 decision outcomes, particularly investment efficiency. Fourth, like other emerging countries,
43 investment inefficiency is pervasive in the Malaysian market (Sussangkarn *et al.*, 2011).
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51 Based on 2,022 firm-year observations for 2016-2020, we find a positive relationship
52 between female CFOs and investment efficiency that is consistent with previous studies that
53 posit females' risk aversion and improve corporate outcomes. More importantly, we find the
54 effect grew stronger as the number of female directors increased on the board of directors. This
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3 **might** indicate that the presence of female directors grants greater managerial decisions and
4 promotes trust and cooperation for female CFOs to improve investment efficiency.
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6 Specifically, based on a series of robustness tests, including endogeneity to triangulate our
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8 main findings, we report evidence that the disparities of gender risk aversion and the
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10 cooperation between female CFOs and female directors affect investment efficiency.
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15 We offer several contributions. First, our study contributes to the homophily literature
16 on female cooperation in the capital market by providing empirical evidence, as research in
17 this area primarily relies on lab and experimental-based methods (Schei & Rognes, 2019).
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19 Second, we add to the ever-growing literature on female participation in the emerging
20 economies' capital market that disparities in risk aversion of CFOs' gender affect corporate
21 investment choices apart from other demographic characteristics. Third, we extend the current
22 literature on the impact of females on corporate investment by examining their cooperation. To
23 the best of our knowledge, our study is the first to consider the effect of female cooperation on
24 investment efficiency. **The result indicates that the presence and cooperation of female CFOs
25 and female directors benefit firm-level investment behaviour. The findings from this study may
26 have practical implications, as policymakers may consider further strengthening policies
27 related to the appointment of females in top management positions. Consequently, practitioners
28 are encouraged to consider female candidates for promotion to top management positions.**
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44 The structure of this paper is as follows. Section 2 provides a literature review and
45 hypotheses development. Section 3 describes the research method. Section 4 reports the main
46 analyses and robustness tests. Section 5 concludes.
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2.0 Literature Review

2.1 Gender differences and corporate outcomes

The individual traits of managers play a crucial role in shaping the decision-making process within a firm (Hambrick & Mason, 1984). Consequently, previous studies establish that gender can influence corporate outcomes, given that gender attitudes toward risk influence managerial behaviour (Francis *et al.*, 2015). Females tend to exhibit more cautious, diligent and less overconfident decision-making behaviour, primarily due to their risk aversion tendency. This is evident in various aspects: they make smaller amounts of investment in risky assets than males (Charness & Gneezy, 2012), allocate their pension funds more conservatively than men (Arano *et al.*, 2010; Bernasek & Shwiff, 2001) and are relatively less overconfident than men by opting for more short-term debt (La Rocca *et al.*, 2020).

At the board level, the presence of female directors has several positive effects because of their risk aversion behaviour. Female directors curb the overconfidence of male CEOs by being less likely to hold deep-in-the-money options (Chen *et al.*, 2019) and restrict managerial opportunism (Zalata *et al.*, 2019a). Female directors mitigate the detrimental effects of powerful CEOs on stock price crash risk (Shahab *et al.*, 2020) and influence firm risk by contributing to a decrease in the variability of the stock market returns (Lenard *et al.*, 2014). Studies such as Zalata *et al.* (2019a) and Srinidhi *et al.* (2011) find female directors enhance earnings quality due to their risk aversion behaviour. Moreover, the presence of female directors reduces the probability of fraud and financial distress (Cumming *et al.*, 2015; García & Herrero, 2021). However, studies focusing on the risk-taking behaviour of female CFOs are limited, which presents an opportunity for further investigation (Hurley & Choudhary, 2020). Some studies examine the effect of female CFOs on earnings quality and accounting conservatism (Barua *et al.*, 2010; Francis *et al.*, 2015; Liu *et al.*, 2016; Ismail *et al.*, 2021), accounting fraud and financial statements irregularities (Liao *et al.*, 2019; Gupta *et al.*, 2020;

Luo *et al.*, 2020), stock price crash risk (Hasan *et al.*, 2023) and cash holdings (Doan & Iskandar-Datta, 2020; Xu *et al.*, 2019).

Subsequently, when examining at the senior management level, including CEOs and CFOs, ample research highlights the disparities in decision outcomes between female CEOs and their male counterparts. During the financial crisis, female CEOs demonstrate a more cautious approach by holding a more conservative level of capital (Palvia *et al.*, 2015) and tend to exhibit higher levels and conservative use of physical cash, indicating that female CEOs are more risk averse (Sah *et al.*, 2022). Zalata *et al.* (2019b) find female CEOs significantly reduce classification shifting than male CEOs after the passage of the SOX Act, further emphasising their risk-averse tendencies.⁹ Female CEOs are less inclined to allow opportunistic related party transactions (Farooq *et al.*, 2022), have a negative relationship with corporate unsustainable environmental policies (Zhang *et al.*, 2023) and are less likely to have higher debt ratio (Graham *et al.*, 2013). In summary, extant literature reveals that female executives, from directors to CEOs, tend to make cautious decisions, which is evident in conservative investments and pension fund allocations. At the board level, the presence of female directors positively influences decision outcomes by curbing overconfidence and mitigating CEO-driven risks, with female CEOs displaying a more conservative approach during financial crises.

2.2 Female CFOs and investment efficiency

Psychology-based literature argues that greater risk aversion of females is attributable to females feeling emotions such as nervousness and fear stronger than males and viewing risky ventures as a threat (Brody, 1993; Croson & Gneezy, 2009). Moreover, on average, male executives have greater confidence than female executives, making them more likely to accept risky undertakings (Soll & Klayman, 2004; Niederle & Vesterlund, 2007). Hence, the risk-

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3 aversion theory has been widely used to examine the effect of gender differences on decision
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5 outcomes (Zalata *et al.*, 2019b).
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8 At the executive level, Ullah *et al.* (2021) assert that female CEOs are associated with
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10 higher investment efficiency but only in non-state-owned enterprises. Where under-investment
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12 is the leading cause of investment inefficiency, female CEOs can mitigate the under-
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14 investment, thereby reducing agency conflict and information asymmetry (Ullah *et al.*, 2020a).
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16 Only Liu *et al.* (2022) examine the relationship between female CFOs and investment
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18 efficiency. They mooted that due to the risk aversion and caution of female CFOs, they can
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20 curb over-investment and are more likely to act in shareholders' best interest. Based on the
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22 arguments that females are more risk-averse, we anticipate that female CFOs can increase
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24 investment efficiency. Hence, we predict the following hypothesis:
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28 *H₁: There is a positive relationship between the presence of female CFOs and investment*
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30 *efficiency.*
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33 34 2.3 Gender interactions between female CFOs and the board of directors 35

36 The extent to which female CFOs can exercise managerial discretion to influence corporate
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38 policies largely depends on their interaction with other powerful executives (CEO) and
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40 directors, who can constrain or amplify their impact on corporate outcomes (Wangrow *et al.*,
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42 2015). Hence, we posit that the presence of female directors moderates the impact of female
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44 CFOs on investment efficiency. This is based on the homophily theory that posits individuals
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46 have a higher tendency to interact with others similar to them (McPherson *et al.*, 2001).
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48 Homophily (Marmaros & Sacerdote, 2006; Bayer, Ferreira & McMillan, 2007) limits
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50 individuals' social world in a way that has powerful implications for the information they
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52 receive, their behaviour, and the interactions they experience. Arguably, such interactions help
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54 overcome informal barriers to trade (information costs, risk, and uncertainty) by building trust,
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56 which may substitute for the difficulty in enforcing contracts.
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3 This interaction has significant economic consequences on corporate outcomes (Ertug *et*
4 *al.*, 2022). On the one hand, homophily fosters smoother coordination, enhanced trust and
5 better communication between similar people. On the other hand, homophily has negative
6 consequences by limiting access to diverse knowledge or perspectives, as similar people are
7 more likely to possess similar knowledge or viewpoints (Ertug *et al.*, 2020). Hence, homophily,
8 which includes similarity in gender and risk aversion behaviour, exists between female CFOs
9 and female directors and could positively impact investment efficiency.
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19 Studies such as Yu (2023) and Harjoto *et al.* (2018) document that female directors play
20 a crucial role in enhancing investment efficiency, especially when the board has a higher
21 proportion (i.e. critical mass) of female directors (Farooq *et al.*, 2023). Critical mass is achieved
22 when three or more female directors are on the board. Below this critical mass, female directors
23 may find it challenging to exert meaningful influence on the board, as they might be ignored
24 due to their minority status on the board or seen as mere tokens (Konrad *et al.*, 2008).
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33 By achieving critical mass, they can form alliances that significantly amplify their
34 influence on board discussions and decision-making processes (Konrad *et al.*, 2008). Hence,
35 in corporate leadership, which is typically viewed as male-oriented, the presence of female
36 directors increases the likelihood that the viewpoints and information provided by female CFOs
37 are given due consideration by the board (Davis & Gracia-Cestona, 2023) because gender
38 similarity fosters trust and cooperation (Rogers & Kincaid, 1981; Ibarra, 1992; Carli, 2001;
39 Amore *et al.*, 2014).
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49 Furthermore, there is evidence of homophily in risk preferences between female CFOs
50 and female directors. Studies on female CFOs and female directors demonstrate that they tend
51 to reduce risky acquisitions (Huang & Kisgen, 2013; Levi *et al.*, 2014; Grossman *et al.*, 2022),
52 enhance earnings quality (Francis *et al.*, 2015; Zalata *et al.*, 2021), lower corporate cash
53 holdings (Atif *et al.*, 2019; Doan & Iskandar-Datta, 2020) and improve investment efficiency
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3 (Liu *et al.*, 2022; Yu, 2023) due to their risk-averse behaviour. As a result of sharing similar
4 risk aversion behaviour, female CFOs perceive female directors as more cooperative and
5 receptive to their ideas, thereby improving decision-making and granting them greater
6 managerial discretion (Ertgu *et al.*, 2020; Schopohl *et al.*, 2021). Hence, we anticipate that the
7 presence of female directors encourages female CFOs to disseminate reliable firm-specific
8 information to improve investment efficiency.
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17 The gender spillover argument (Kunze & Miller, 2017) suggests that the interaction
18 between female workers could positively or negatively impact organisational outcomes. Kunze
19 and Miller (2017) argue that competition among female workers could lead to better
20 performance. However, such competition could have a negative impact in response to tokenism
21 and the workplace. Kunze and Miller (2017) show that the existence of female business leaders
22 positively related to the increase in promotion rates for female executives of lower rank relative
23 to male executives. Similarly, Eckel and Grossman (2001) show that female executives are
24 more likely to accept offers made by other female executives, and consensus among them is
25 more easily achievable.
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38 Studies on gender interaction, such as Amore *et al.* (2014), find that the interaction
39 between the proportion of female directors and female CEOs increases firm profitability.
40 However, this positive effect is reduced when the firm is located in geographical areas
41 characterised by a conservative view of the female's role in society. Xing *et al.* (2021) also
42 show that the interaction between female directors and executives increases firm performance.
43 Davis and Gracia-Cestona (2023) find the interaction of female CFOs and female directors
44 reduces financial restatement. Schopohl *et al.* (2021) argue that female CFOs can reduce a
45 firm's leverage in highly gender-diverse boards as gender-diverse boards provide them with
46 greater managerial discretion. Schopohl *et al.* (2021) state that a higher degree of diversity
47 effectively weakens social barriers that create a more conducive environment for decision-
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3 making. However, the impact of this interaction on investment efficiency warrants further
4 investigation. Drawing from homophily, gender spillover and risk preferences between female
5 directors and female CFOs could foster trust and cooperation, which can amplify their
6 managerial discretion; we postulate the following hypothesis:
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12 *H₂: The positive relationship between female CFOs and investment efficiency is strengthened*
13 *with the presence of female directors on the board.*
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17 **3.0 Research Methodology**

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19 We utilise the data of non-financial public listed firms in Bursa Malaysia's Main Market from
20 2016 to 2020. Financial data is retrieved from Compustat Global and ORBIS, and non-financial
21 data, such as the gender of CFOs, is hand-collected from firms' annual reports available on the
22 Bursa Malaysia website. The year 2016 was chosen since it is the first year for publicly traded
23 firms to meet the Malaysian government's policy goal of females filling 30% of top
24 management positions. Hence, it is reasonable to assume that the number of females in top
25 management increased in 2016. Moreover, beginning in 2016, firms began to disclose the CFO
26 profile (in addition to the existing CEO profile) in their annual reports as a result of a new
27 requirement in Bursa Malaysia Appendix C (Disclosure in Annual Report) (Bursa Malaysia
28 Listing Requirements, 2021).⁷ We excluded firms in the financial industry because the Central
29 Bank of Malaysia highly regulates them and firms with any missing data to calculate any
30 variables in this study. We also require firms to be listed for the entire study period. The
31 selection process yields our final sample of 2,022 firm-year observations.
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50 *3.1 Dependent variable*

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52 Following Lai *et al.* (2020), we use a model motivated by the accounting and finance literature
53 on optimal investment (e.g., Hubbard, 1998; Biddle & Hilary, 2006; McNichols & Stubben,
54 2008; Biddle *et al.*, 2009). Deviations from the model, which are over-investment (positive
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deviations from expected investment) and under-investment (negative deviations from expected investments), are considered inefficient. The model is described as follows:

$$INV_{it} = a + b_1 Q_{it-1} + e_{it}$$

(Equation 1)

where total investment, INV_{it} is the sum of capital expenditures (Compustat Item 128), research and development (R&D) expenditures (Compustat Item 46), and acquisitions (Compustat Item 129) minus sales of property, plant and equipment (PPE) (Compustat Item 107), scaled by the prior-year book value of total assets (Compustat Item 6) for firm i in year t . Following Richardson (2006) and Biddle *et al.* (2009), our primary investment measure includes capital and non-capital expenditures. Q is the beginning of year t market value of total assets divided by the book value of total assets, which is calculated as the ratio of the market value of total assets (Compustat Item 6 [Compustat Item 25 x Compustat Item 199] Compustat Item 60 – Compustat Item 74) divided by the book value of total assets (Compustat Item 6) for firm i in year $t-1$.

The residuals from the regression model reflect the deviation from the expected investment level. A negative residual means under-investment, and a positive residual means over-investment. We multiply the residual value with -1 for ease of interpretation and reflect investment efficiency instead. Hence, the test variables' positive (negative) coefficient would reflect higher (lower) investment efficiency.

3.2 Independent test variables

The study has two primary independent test variables. The first takes the value of 1 if the chief financial officer is female (*FCFO*) and zero otherwise. We expect the coefficient for *FCFO* to be positive to reflect better investment efficiency. The second variable is the proportion of

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3 female directors (*FBOARD*).⁸ The data is hand-collected from the annual reports downloaded
4 from Bursa Malaysia.
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7 8 9 3.3 Control variables

10 We have several control variables for this study. The first control variable is the natural log of
11 the total number of board of directors (*LBSIZE*), in which we predict an ambiguous
12 relationship. Larger boards could increase efficiency due to synergy and diversity but could
13 translate to a slower decision-making process (Guest, 2009). Next, we include independent
14 directors on the board (*INED*) and predict a positive relationship as Tran (2019) and Rajkovic
15 (2020) argue monitoring role of independent directors is important as CEO power could lead
16 to entrenchment and increase agency costs.
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26 We include the cash flow for operations (*CF*) and predict a positive relationship. Biddle
27 and Hilary (2006) suggest capital rationing, which increases reliance on internal funding and
28 agency problems, could instigate a relationship between cash flow and investment efficiency.
29 Next, we control for tangible assets (*TANG*). We predict a negative relationship as Benlemlih
30 and Bitar (2016) show higher levels of tangible assets reduce investment efficiency. We posited
31 a positive impact of leverage (*LEV*). Lei and Chen (2018) show that a higher leverage risk
32 motivates managers to improve investment efficiency since it would impact the overall
33 organisational performance. We include firm size (*FSIZE*) primarily to control for the 'size
34 effect' across the sample and a positive relationship is posited (Wang *et al.*, 2020).
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47 Next, we control for cash dividend payout (*DIV*) and predict a positive relationship
48 with investment efficiency, as Chan *et al.* (2022) suggest that cash dividend payout mitigates
49 overinvestment. This argument holds since holding cash is important for dividends and
50 investment. We include institutional ownership (*INSTOWN*), and a positive relationship is
51 predicted and consistent in Malaysian literature (see Abdul Wahab *et al.*, 2007; Abdul Wahab
52 *et al.*, 2011; Tee *et al.*, 2017) that argue institutional investors play a monitoring role and offers
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3 protection to minority shareholders. The increased monitoring would then enhance investment
4 efficiency, supported by Eissa *et al.*'s (2023) findings. Next, we include loss during the year
5 (*LOSS*) and predict a negative relationship, as Benlemlih and Bitar (2016) find a negative
6 relationship between loss and investment efficiency.
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12 Since Malaysia is known as a relationship-based economy, we include Bumiputera
13 directors (*BUMI*) and politically connected firms (*PCON*) as our control variable.⁹ The
14 appointment of Bumiputera directors (dominated by Malay) is a proxy of political patronage
15 as it is subject to promoting cronyism and nepotism of the ruling party (Gul, 2006; Gist &
16 Abdul Wahab, 2021). Hence, Bumiputera directors are more likely to be involved in rent-
17 seeking activities (Gomez, 2007), reducing investment efficiency (Scharfstein & Stein, 2000).
18 Therefore, we predict a negative relationship between Bumiputera directors and investment
19 efficiency.
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31 In addition, we include politically connected firms (*PCON*), which takes the value of 1
32 if the firm is connected based on Wong and Hoo's (2018) specifications and zero otherwise.
33 We predict a negative relationship between *PCON* and investment efficiency as Chen *et al.*
34 (2011), as connected firms are subject to high(er) inherent risk (Gul 2006), income stream
35 uncertainty (Chen *et al.*, 2010), and rent-seeking activities (Faccio *et al.*, 2006) and these will
36 eventually impact investment efficiency negatively.
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44 We include the tenure of the CFO in the firm (*TENURE*) and predict a positive
45 relationship as CFOs with longer tenure are more risk-averse and conservative, making them
46 make efficient investments (Audia *et al.*, 2000). Bae *et al.* (2017) find larger audit firms
47 improve clients' investment efficiency by having greater knowledge and resources available to
48 their clients. Hence, we control for auditor size (*BIG4*) and predict a positive relationship with
49 investment efficiency. Additionally, we include earnings management (*ABSDA*) and predict a
50 negative relationship with investment efficiency as lower-quality earnings impact information
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asymmetries and cause moral hazard and adverse selection (Biddle *et al.*, 2009). Finally, we have included the total number of employees (*NUMEMPLOY*) as an exclusion restriction variable for our endogeneity tests.

Table 1 presents the operationalisation definition of the variables used in this paper.

[Table 1 about here]

3.4 Regression models

We estimate the models using *t*-statistics based on standard errors clustered at the firm and the year level, which are robust to heteroskedasticity and within-firm serial correlation. We included industries and period-fixed effects for unobserved heterogeneity.

The following model (Equation 2) addressed hypothesis 1, which examined the relationship between female CFOs and investment efficiency.

$$EFFINV = \beta_0 Intercept_{it} + \beta_1 FCFO_{it} + \beta_2 FBOARD_{it} + \beta_3 LBSIZE_{it} + \beta_4 INED_{it} + \beta_5 CF_{it} + \beta_6 TANG_{it} + \beta_7 LEV_{it} + \beta_8 DIV_{it} + \beta_9 LOSS_{it} + \beta_{10} INSTOWN_{it} + \beta_{11} BUMI_{it} + \beta_{12} PCON_{it} + \beta_{13} TENURE_{it} + \beta_{14} BIG4_{it} + \beta_{15} ABSDA_{it} + \beta_{16-24} INDUSTRIES_{it} + \beta_{25-28} PERIODS_{it} + \epsilon_{it}$$

(Equation 2)

Next, we have the following model to address hypothesis 2. We include the interaction term *FCFO*FBOARD* in Equation 3.

$$EFFINV = \beta_0 Intercept_{it} + \beta_1 FCFO_{it} + \beta_2 FBOARD_{it} + \beta_3 FCFO*FBOARD_{it} + \beta_4 LBSIZE_{it} + \beta_5 INED_{it} + \beta_6 CF_{it} + \beta_7 TANG_{it} + \beta_8 LEV_{it} + \beta_9 DIV_{it} + \beta_{10} LOSS_{it} + \beta_{11} INSTOWN_{it} + \beta_{12} BUMI_{it} + \beta_{13} PCON_{it} + \beta_{14} TENURE_{it} + \beta_{15} BIG4_{it} + \beta_{16} ABSDA_{it} + \beta_{17-25} INDUSTRIES_{it} + \beta_{26-29} PERIODS_{it} + \epsilon_{it}$$

(Equation 3)

EFFINV is absolute investment inefficiency multiplied by -1, *FCFO* is female CFOs =1 if firms have female CFOs, zero otherwise, *FBOARD* is the proportion of female directors, and all control variables' operational definitions are as defined in Table 1.

There is a potential concern that the positive relationship between female CFOs and investment efficiency is due to firm-specific characteristics. Therefore, we employed Heckman's two-stage selection model to alleviate selection bias concerns. In the first stage, we use *FCFO* as the endogenous variable in a Probit regression to predict female appointments as CFOs. The self-selection equation is as follows:

$$FCFO_{it} = \beta_0 Intercept_{it} + \beta_1 FBOARD_{it} + \beta_2 LBSIZE_{it} + \beta_3 INED_{it} + \beta_4 CF_{it} + \beta_5 TANG_{it} + \beta_6 LEV_{it} + \beta_7 DIV_{it} + \beta_8 LOSS_{it} + \beta_9 INSTOWN_{it} + \beta_{10} BUMI_{it} + \beta_{11} PCON_{it} + \beta_{12} TENURE_{it} + \beta_{13} BIG4_{it} + \beta_{14} ABSDA_{it} + \beta_{15} NUMEMPLOY_{it} + \beta_{16-20} PERIODS_{it} + \beta_{21-25} INDUSTRIES_{it} + \epsilon_{it}$$

(Equation 4)

In Equation 4, the control variables are as previously used and defined. In addition, we include the number of employees (*NUMEMPLOY*) as an exclusion restriction. The exclusion restriction should influence the sample selection (first stage) but not the second stage's ultimate error term (Certo *et al.*, 2016). We opted for the number of employees because Hurley and Choudhary (2016) discovered that firms with a large workforce are more likely to hire female top managers. However, the number of employees is not related to investment efficiency. Nevertheless, we acknowledge that any variables used as exclusion restrictions are unlikely to produce estimates with desirable econometric properties as selection models are fragile (Larcker *et al.*, 2010; Lennox *et al.*, 2012). Next, we generate the inverse Mills ratio (*IMR*) after the probit choice regression.

In the second stage, the *IMR* generated in the first stage is added to Equation 5 to control for any endogeneity in the choice of female CFOs. The resulting equation is as follows:

$$EFFINV = \beta_0 Intercept_{it} + \beta_1 FCFO_{it} + \beta_2 FBOARD_{it} + \beta_3 LBSIZE_{it} + \beta_4 INED_{it} + \beta_5 CF_{it} + \beta_6 TANG_{it} + \beta_7 LEV_{it} + \beta_8 DIV_{it} + \beta_9 LOSS_{it} + \beta_{10} INSTOWN_{it} + \beta_{11} BUMI_{it} + \beta_{12} PCON_{it} + \beta_{13} TENURE_{it} + \beta_{14} BIG4_{it} + \beta_{15} ABSDA_{it} + \beta_{16} NUMEMPLOY_{it} + \beta_{17-21} PERIODS_{it} + \beta_{22-26} INDUSTRIES_{it} + \beta_{27} IMR_{it} + \epsilon_{it}$$

(Equation 5)

4.0 Results

4.1 Data description

Table 2 tabulates the descriptive statistics for this study. Panel A of Table 2 presents the mean value of investment efficiency (*EFFINV*), which is -0.231. This value is significantly lower than that recorded in developed countries, such as the U.S., which recorded zero, reflecting better investment efficiency (Verdi, 2006). This finding aligns with previous literature suggesting that investment inefficiency is more prevalent in emerging countries than in developed countries (e.g. Chen *et al.*, 2011). The average of female directors (*FBOARD*) is 15 percent, slightly lower than Security Commission Malaysia (2021), which reported 18 percent in 2020. The average board size (*BFSIZE*) is seven, consistent with Johl *et al.*'s (2015) finding that seven directors efficiently improves firm performance in Malaysia.

The average independent directors on the board (*INED*) are 51 percent, indicating that in most sampled firms, at least half of their board members are independent directors. They comply with MCCG 2021 (Principle A), which requires that at least half of the board are independent directors. The average earnings management (*ABSDA*) is 0.060, slightly lower than other studies in Malaysia, such as Abdullah and Ku Ismail (2016). One explanation for these findings is that, over time, earnings management is mean-reverting due to firms decreasing reported earnings in the current period and experiencing a subsequent increase in future period's reported earnings (Dechow *et al.*, 1995). Panel B of Table 2 shows that 34 percent of sample firms have a female CFO (*FCFO*), comparable with the number reported by Deloitte (2021) at 34.9 percent.

[Table 2 about here]

4.2 Univariate

We examine the mean and median differences between firms that appointed female CFOs and male CFOs. Firms with female CFOs significantly have greater investment efficiency (*EFFINV*) than those with male CFOs, which provides preliminary support for our prediction on hypothesis 1 (H_1). The correlation matrix does not indicate any association that is above 0.70. Hence, we conclude that there is no multicollinearity issue between variables.¹⁰

4.3 Multivariate

Table 3 presents the main regression analyses for hypotheses 1 (H_1) and 2 (H_2). Column 1 of Table 3 finds *FCFO* improves investment efficiency (0.031, $t=2.850$, $p<0.01$, one-tailed test), which supports our first hypothesis that appointing a female CFO impacts investment efficiency positively. This finding provides support for H_1 . The result suggests that female CFOs are more likely to improve the efficiency of an investment than male CFOs, mitigate the agency concern (Ullah *et al.*, 2020a) and corroborate prior studies that find female CFOs improve investment efficiency as they are more risk-averse than male CFOs (Liu *et al.*, 2022).

By addressing agency concerns, female CFOs potentially enhance transparency, reduce conflicts of interest, and foster an environment conducive to optimal investment strategies. The risk-averse nature of female CFOs may lead to a more careful evaluation of investment opportunities, minimising the likelihood of excessive risk-taking and promoting long-term financial stability (Liu *et al.*, 2022). More importantly, the finding supports the context of female executives' traits that tend to exhibit more cautious, diligent, and less overconfident behaviour.

Our H_2 provides an incremental finding, as no study considered how investment efficiency is affected by the interaction between female CFOs and female directors. In Column 2, we find the interaction term (*FCFO*FBOARD*) to be positively and significantly associated with investment efficiency (0.313, $t=3.530$, $p<0.01$, one-tailed test). The result supports the

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3 homophily theory that similarity in gender increases cooperation and trust (McPherson *et al.*,
4 2001) by fostering smoother coordination and enhancing communication (Ertug *et al.*, 2022).
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6 Our findings also support the positive gender spillover (Kunze & Miller, 2017) that the
7 presence of higher-ranking females (directors) promotes cooperation among lower-ranking
8 females (CFOs). This finding underscores the significance of female directors who share
9 similar traits (gender and risk aversion) with female CFOs, as it fosters trust and grants female
10 CFOs greater managerial discretion to improve investment efficiency. Overall, our results
11 remain robust in all of the robustness tests, even after controlling for the impact of the Covid-
12 19 year.¹¹

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14 For control variables, consistent with our expectations, we find firms with a larger board
15 size (*LBSIZE*), higher operating cash flow (*CF*), higher level of leverage (*LEV*), pay cash
16 dividend (*DIV*), higher level of CFO tenure (*TENURE*), and audited by BIG4 auditors (*BIG4*)
17 are more likely to increase investment efficiency. Contrary to our prediction, political
18 connection (*PCON*) is positively associated with investment efficiency. We find that firms with
19 higher tangible assets (*TANG*), incurred loss (*LOSS*), higher levels of Bumiputera directors
20 (*BUMI*), and higher discretionary accruals (*ABSDA*) are more likely to reduce investment
21 efficiency as the relationships are significantly negative. Hence, the significant control
22 variables decrease the error term and limit the potential confounding effects on our dependent
23 variable.

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48 [Table 3 about here]
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51 4.4 Robustness test

52 4.4.1 Over and under-investment

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54 As an extended analysis, we divide our sample into over-investment and under-investment.

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56 This investigation is to test whether the presence of female CFOs and their interaction with
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3 female directors would impact over and under-investment. These inefficiencies are often
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5 viewed as value-distorting activities (Cultillas Gomariz & Sanchez Ballesta, 2014). We posited
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7 that female CFOs' impact will be more pronounced on over-investment than under-investment
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9 as female executives avoid risky financing and investment opportunities (Liu et al., 2022).
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11 Similar to our H_2 , we posited the impact will be alleviated with the interactions with female
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13 directors. ¹²

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17 Table 4 tabulates the (abridged) results. We find female CFOs reduce over-investment
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19 but no evidence in reducing under-investment, which further supports our H_1 that female CFOs
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21 are more risk averse than male CFOs (Liu et al., 2022) as over-investment is a phenomenon
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23 that worsens firm value and performance (Ding et al., 2019; Shin et al., 2020; Trong & Nguyen,
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25 2020). Further, the interaction results hold regardless of over or under-investment, which
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27 further supports our H_2 that female directors increase the managerial discretion of female CFOs
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29 to improve investment efficiency.
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35 [Table 4 about here]
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40 4.4.2 Do changes in CEOs drive results? 41

42 Previous studies show significant changes in investment efficiency following a change in
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44 CEOs. Newly appointed CEOs are prone to invest less and more efficiently due to career
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46 concerns (Xie, 2015). Therefore, we identify cases where firms appoint new CEOs to ensure
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48 that a current CEO change does not confound our results. We exclude firms with CEO changes
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50 during the observation years. Then, we re-estimate baseline regression using the reduced
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52 sample. Panel A in Table 5 shows that **FCFO** affects investment efficiency positively and
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54 significantly. Similarly, the result of the interaction $FCFO*FBOARD$ holds further support for
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our H_2 . Thus, these results suggest that our finding of a significant improvement in investment efficiency when there are female CFOs cannot be attributed to changing the firm's CEO.

[Table 5 about here]

4.4.3 *Switching CFOs*

To further examine the significant increase in investment efficiency due to risk-aversion of female CFOs, we construct a sample of male-to-female CFOs transition. The results (not reported for brevity) remain similar to the main findings, further supporting our conjecture in H_1 and H_2 . To the extent that the significant increase in investment efficiency following a male-to-female CFO transition is due to the different risk preferences between female CFOs and male CFOs, we expect a decrease in the level of investment efficiency after firms change their CFOs from female to male. Hence, we construct a sample of female-to-male CFOs transition to examine if this is the case.

Panel B in Table 5 shows female-to-male CFOs transition (*CFOTRANS*) reduces investment efficiency, consistent with our conjecture that male CFOs are less risk averse than female CFOs, as evidenced by the finding that after firms switch their CFOs from female to male. We do not find any relationship between the cooperation of female-to-male CFOs transition with female directors on the board of directors on investment efficiency. This further supports our H_2 that female directors are less likely to cooperate with the opposite gender (male) to improve investment efficiency. These results triangulate our main findings.

4.4.4 *Heckman's two-stage selection model*

We employed Heckman's two-stage selection model to alleviate selection bias concerns and retested H_1 and H_2 to support our results as a robustness check. Similar to the main results, Panel A in Table 6 shows that the result of *FCFO* and the interaction term (*FCFO*FBOARD*)

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3 is positive and significant with investment efficiency, suggesting that the main results are not
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5 affected by selection bias since the *IMR* is insignificant for both regressions.
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13 4.4.5 Propensity score matching

14 We adopt propensity score matching (PSM) following previous literature on CFO gender, such
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16 as Francis *et al.* (2015). PSM allows us to control for potential unobservable factors
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18 contemporaneously influencing both CFO appointments and corporate investment policies. We
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20 construct a propensity score-matched sample of treatment (firms with female CFOs) and
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22 control (firms without female CFOs) firms to eliminate the differences in firm-specific factors,
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24 as in Rosenbaum and Rubin (1983). Specifically, we run a logistic regression of firms with
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26 female CFOs on all control variables, including the year and industry effect and the exclusion
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28 restriction (number of employees). The propensity score obtained from the logistic regression
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30 is used to perform a one-to-five nearest neighbour match. To avoid weak matching, we use a
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32 calliper distance of 0.001 (Gull *et al.*, 2018).
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39 Panel B of Table 6 reports the PSM results. We find that the coefficient of *FCFO* is
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41 0.024 and is significant at the 5 percent level, and the coefficient of the interaction of
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43 *FCFO*FBOARD* is 0.329 and is significant at the 1 percent level. This indicates that firms
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45 under the control of female CFOs on average, have a higher degree of investment efficiency
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47 and their cooperation with female directors accentuated investment efficiency, compared to the
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49 matching firms under male CFOs' control. We also perform a one-to-one nearest neighbour
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51 match (not reported for brevity), and the results remain similar. Thus, the results of the PSM
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53 approach mitigate the self-selection bias concern and further confirm our main findings.
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5.0 Conclusion

Unlike previous studies that concentrate on the impact of top management's gender on investment efficiency in isolation, this paper focuses on the impact of the cooperation between female CFOs and female directors on investment efficiency. Given the prevalence of investment inefficiency in emerging countries such as Malaysia, we predict the presence of female CFOs and their cooperation with female directors due to risk aversion would improve investment efficiency in Malaysia.

Our results support the first hypothesis that female CFOs improve investment efficiency in Malaysian publicly listed firms due to their risk aversion behaviour. Next, we find this positive relationship is amplified with the presence of female directors on the board. The results support our arguments that female CFOs and female directors cooperate to enhance organisational outcomes, specifically investment efficiency. To further support our conjecture, we perform over and under-investment analysis and exclude changes in CEOs from the sample to ensure that changes in CEOs do not compound our result. We also constructed a sample of male-to-female and female-to-male CFO transitions to triangulate the main findings. Our results hold for all of these tests, indicating that the risk aversion of female CFOs improves investment efficiency, and the presence of female directors amplifies this. Our results are also robust after we tested the impact of endogeneity using Heckman's two-stage selection model and propensity score matching (PSM). Hence, this finding highlights the presence of female CFOs and female directors as determinants that could improve investment efficiency in Malaysia, particularly where investment inefficiency is prevalent.

This paper contributes to the literature on the effect of female CFOs on investment efficiency in an emerging country. Most importantly, the results on female cooperation extend the current literature that their cooperation yields better decision-making outcomes, improving investment efficiency. This is the first study that provides evidence that female CFOs and the

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3 presence of female directors play an important role in investment efficiency. Findings from
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5 this study also have practical implications in that promoting more females to top management
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7 positions is beneficial for firms to improve their investment efficiency. Hence, practitioners,
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9 especially publicly listed firms, may consider appointing more females to top management
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11 positions. In addition, the investors may pressure publicly listed firms to appoint more females
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13 at top management as their presence could protect the interest of investors by improving the
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15 resource allocation for efficient investment. These findings could interest policymakers,
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17 particularly regulators whose missions or policies are to increase female participation at the top
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19 management level, especially in emerging countries such as Malaysia. These findings informed
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21 the regulators that the policy to increase the number of females in top management positions is
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23 based on moral judgement and establishing a business case as their presence improves
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25 investment efficiency.

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30 The results must be interpreted cautiously as this study has several limitations. First, we
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32 did not consider a direct measure for cooperation between female CFOs and female directors.
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34 Although the results yielded positive outcomes, the interpretation could be strengthened by an
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36 in-depth interaction analysis, such as investigating the meeting minutes. Second, although we
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38 control for factors associated with investment efficiency, other unobservable factors or firm
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40 characteristics correlate with female CFOs in affecting investment efficiency. Third, the
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42 survivorship bias arises in this study as we required firms to be listed throughout the entire
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44 study period. Lastly, the measurement of investment efficiency is always susceptible to
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46 measurement errors as it is subject to assumption bias, in which even slight changes in the
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48 underlying assumptions can undermine the validity of the measurement. While we examine the
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50 effect of female CFOs and the cooperation of female CFOs and female directors on investment
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52 efficiency, future research can examine the channels through which female CFOs may
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3 influence investment efficiency, including other demographic characteristics such as ethnicity,
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5 tenure, age and academic degree.
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Notes

1. We use CFOs because Hambrick (2007) stated that it is crucial to meticulously match the corporate outcomes to the individual managers primarily responsible for them when testing if managerial characteristics, such as gender, matter. Given their typical role in managing and overseeing finance and accounting activities, CFOs are more likely to influence corporate finance and accounting decisions directly (Ge *et al.*, 2011).
2. Specifically, CFOs have the fiduciary duties to produce financial statements that fairly represent a firm's financial condition (Indjejikian & Matejka, 2009). Hence, they directly influence the firm's financial and accounting decisions (Biggerstaff *et al.*, 2021; Ge *et al.*, 2011; Hoitash *et al.*, 2016). Therefore, CFOs possess the most accurate and timely information and estimates regarding a firm's cash flow, financial commitments, research and development, and potential investment opportunities (Florackis & Sainani, 2018; Hoitash *et al.*, 2016; Liu *et al.*, 2021).
3. In Malaysia, females constituted 18 percent of the board of directors positions in publicly listed firms in 2020 (Securities Commission Malaysia, 2021). In the recent Malaysian government budget announcement, all publicly listed firms must have at least one female director on the board. Large firms (which are included in the FTSE Bursa Malaysia Top 100 Index or that have a market capitalisation of RM 2 billion and above at the start of the financial year) must have at least one female director by September 2022 and all other listed firms by January 2023 (Raghu & Shukry, 2021). Interestingly, Malaysia has the highest percentage of female CFOs among Asian nations, at 34.9 percent in 2021 (Deloitte, 2022). Recent anecdotal shows that publicly listed firms have taken proactive actions to increase female representation at their firms. For instance, Petronas Berhad and Malayan Banking Berhad first appointed a female as their CFOs since the establishment of the firms (Aziz, 2020; Adilla, 2021).
4. Gender spillover can loosely be defined as the influence of increasing representation of female directors, whether it can assist or hinder the appointment of females to CEO, CFO or other executive levels. Hence, gender spillover can manifest in either positive or negative effects (see, for example, Matsa & Miller, 2011; Kunze & Miller, 2017; Bozhinov *et al.*, 2020).
5. The data are collected from the Securities Commission of Malaysia's annual reports from the year 2014 to 2023. The reports can be accessible from the following website: <https://www.sc.com.my/resources/publications-and-research>
6. According to McVay (2006), classification shifting is an earnings management approach in which managers manipulate item placement within the income statement to improve core earnings.
7. For the senior management level, the CEO and CFO profiles must be disclosed in annual reports. Firms, in their annual reports, voluntarily disclose other senior management profiles.
8. For the interaction term, we drop the calculation of female CFOs who also serve on the board from the proportion of female directors because they represent the same person.

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3 9. The British colony popularised the term Bumiputera or ‘sons of the soil’ during the 1920s
4 and 1930s to distinguish the indigenous people of Malaya (now Malaysia), the majority of
5 whom are Malays, from the Chinese or Indian immigrants, the non-indigenous people.
6 Article 160 (2) of the 1957 Malaysian Constitution defines Malays as a person who
7 professes the religion of Islam, habitually speaks the Malay language, and conforms to
8 Malay customs.
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- 10 10. The univariate and correlation results are tabulated in the Appendix.
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- 12 11. We run a separate test to control for Covid-19 year. We use 2020 as a dummy year for
13 Covid-19 (coded as 1, otherwise = 0) to examine the impact of Covid-19. Overall, our
14 results remain similar to those of the main results (in the Appendix).
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- 17 12. The literature argues that under-investment manifests managers’ risk aversion as they tend
18 to avoid risky but optimal investment projects. Contrarily, over-investment manifests
19 managers’ risk-taking as they may invest in negative net present value to gain personal
20 benefit at the expense of shareholders’ interest (Stulz 1990; Aggarwal and Samwick 2006;
21 Yermack 2006).
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References

- Abdul Wahab, E. A., How, J., & Verhoeven, P. (2007). The impact of the Malaysian Code on Corporate Governance: Compliance, institutional investors and stock performance. *Journal of Contemporary Accounting & Economics*, Vol. 3 No. 2, pp. 106–129.
- Abdul Wahab, E. A., Jamaludin, M. F., Agustia, D., & Harymawan, I. (2020). Director networks, political connections, and earnings quality in Malaysia. *Management and Organization Review*, Vol. 16 No. 3, pp. 687-724.
- Abdul Wahab, E. A., Zain, M. M., & James, K. (2011). Political connections, corporate governance and audit fees in Malaysia. *Managerial Auditing Journal*, Vol. 26 No. 5, pp. 393-418.
- Abdullah, S. N., & Ismail, K. N. I. K. (2016). Women directors, family ownership and earnings management in Malaysia. *Asian Review of Accounting*, Vol. 24 No. 4, pp. 525-550.
- Adilla F. (2021). Khalijah Ismail is Maybank's new group CFO. Retrieved from <https://www.nst.com.my/business/2021/09/732459/khalijah-ismail-maybanks-new-group-cfo/>. Accessed February 8, 2022.
- Aggarwal, R. K., & Samwick, A. A. (2006). Empire-builders and shirkers: Investment, firm performance, and managerial incentives. *Journal of Corporate Finance*, Vol.12 No.3, pp. 489-515.
- Amore, M. D., Garofalo, O., & Minichilli, A. (2014). Gender interactions within the family firm. *Management Science*, Vol. 60 No. 5, pp. 1083-1097.
- Arano, K., Parker, C., & Terry, R. (2010). Gender-based risk aversion and retirement asset allocation. *Economic Inquiry*, Vol. 48 No. 1, pp. 147-155.
- Atif, M., Liu, B., & Huang, A. (2019). Does board gender diversity affect corporate cash holdings?. *Journal of Business Finance & Accounting*, Vol. 46 No.7-8, pp. 1003-1029.
- Audia, P. G., Locke, E. A., & Smith, K. G. (2000). The paradox of success: An archival and a laboratory study of strategic persistence following radical environmental change. *Academy of Management Journal*, Vol. 43 Vol. 5, pp. 837–853
- Aziz A. (2020). The edgemarkets.com. Petronas welcomes first woman CFO as management reshuffles after change of guard. <https://www.theedgemarkets.com/article/management-reshuffle-petronas-after-change-guard/>. Accessed February 21, 2022
- Bae, G. S., Choi, S. U., Dhaliwal, D. S., & Lamoreaux, P. T. (2017). Auditors and client investment efficiency. *The Accounting Review*, Vol. 92 No. 2, pp. 19-40.
- Balliet, D., Li, N. P., Macfarlan, S. J., & Van Vugt, M. (2011). Sex differences in cooperation: a meta-analytic review of social dilemmas. *Psychological Bulletin*, Vol. 137 No. 6, pp. 881-909.

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4 Barua, A., Davidson, L. F., Rama, D. V., & Thiruvadi, S. (2010). CFO gender and accruals
5 quality. *Accounting Horizons*, Vol. 24 No. 1, pp. 25-39.
6
7
8 Bayer, P., Ferreira, F., & McMillan, R. (2007). A Unified Framework for Measuring
9 Preferences for Schools and Neighborhoods. *Journal of Political Economy*, Vol.115 No.4,
10 pp. 588–638.
11
12
13 Benlemlih, M., & Bitar, M. (2018). Corporate social responsibility and investment
14 efficiency. *Journal of Business Ethics*, Vol.148, pp. 647-671.
15
16 Bernasek, A., & Shwiff, S. (2001). Gender, risk, and retirement. *Journal of Economic*
17 *Issues*, Vol. 35 No. 2, pp. 345-356.
18
19
20 Biddle, G. C., & Hilary, G. (2006). Accounting quality and firm-level capital investment. *The*
21 *Accounting Review*, Vol. 81 No. 5, pp. 963-982.
22
23
24 Biddle, G. C., Hilary, G., & Verdi, R. S. (2009). How does financial reporting quality relate to
25 investment efficiency? *Journal of Accounting and Economics*, Vol. 48 No. 2-3, pp. 112-
26 131.
27
28
29 Biggerstaff, L. E., Cicero, D. C., Goldie, B., & Reid, L. C. (2021). CFO effort and public firms'
30 financial information environment. *Contemporary Accounting Research*, Vol. 38 No. 2,
31 pp. 1068–113.
32
33
34 Bozhinov, V., Joecks, J., & Scharfenkamp, K. (2021). Gender spillovers from supervisory
35 boards to management boards. *Managerial and Decision Economics*, Vol. 42 No. 5, pp.
36 1317-1331.
37
38
39 Brody, L. R. (1993). Human feelings: Explorations in affect development and meaning,
40 Routledge (Chapter 3).
41
42
43 Bursa Malaysia Listing Requirements (2021). Main Market Chapter 9 Continuing Disclosure.
44 Retrieved from chrome-
45 extension://efaidnbmnnnibpcajpcglclefindmkaj/viewer.html?pdfurl=https%3A%2F%2F/.
46 Accessed on August 26, 2022.
47
48
49 Carli, L. L. (2001). Gender and social influence. *Journal of Social Issues*, Vol. 57 No. 4, pp.
50 725-74.
51
52
53 Certo, S. T., Busenbark, J. R., Woo, H. S., & Semadeni, M. (2016). Sample selection bias and
54 Heckman models in strategic management research. *Strategic Management Journal*, Vol.
55 37 No. 13, pp. 2639-2657.
56
57
58 Chan, R. S. Y., Fan, L., & Song, B. Y. (2022). Unintended benefits of mandatory dividend
59 regulations on investment efficiency: evidence from China. *Accounting & Finance*, Vol. 62,
60 pp. 1461-1493.

- 1
2
3 Charness, G., & Gneezy, U. (2012). Strong evidence for gender differences in risk
4 taking. *Journal of Economic Behavior & Organization*, Vol. 83 No. 1, pp. 50-58.
5
6
7 Chen, C. J. P., Ding, Y., & Kim, C. (Francis). (2010). High-level politically connected firms,
8 corruption, and analyst forecast accuracy around the world. *Journal of International*
9 *Business Studies*, Vol. 41 No. 9, pp. 1505–1524.
10
11 Chen, J., Leung, W. S., Song, W., & Goergen, M. (2019). Why female board representation
12 matters: The role of female directors in reducing male CEO overconfidence. *Journal of*
13 *Empirical Finance*, Vol. 53, pp. 70-90.
14
15
16 Chen, R., El Ghouli, S., Guedhami, O., & Wang, H. (2017). Do state and foreign ownership
17 affect investment efficiency? Evidence from privatisations. *Journal of Corporate*
18 *Finance*, Vol. 42, pp. 408-421.
19
20
21 Chen, S., Sun, Z., Tang, S., & Wu, D. (2011). Government intervention and investment
22 efficiency: Evidence from China. *Journal of Corporate Finance*, Vol. 17 No.2, pp. 259-
23 271.
24
25
26 Croson, R., & Gneezy, U. (2009). Gender differences in preferences. *Journal of Economic*
27 *Literature*, Vol. 47 No. 2, pp. 448-74.
28
29
30 Cumming, D., Leung, T. Y., & Rui, O. (2015). Gender diversity and securities fraud. *Academy*
31 *of Management Journal*, Vol. 58 No. 5, pp. 1572-1593.
32
33 Cutillas Gomariz, M. F., & Sánchez Ballesta, J. P. (2014). Financial reporting quality, debt
34 maturity and investment efficiency. *Journal of Banking & Finance*, Vol.40, pp. 494–506.
35
36
37 Davis, J. G., & Garcia-Cestona, M. (2023). Financial reporting quality and the effects of CFO
38 gender and board gender diversity. *Journal of Financial Reporting and Accounting*, Vol.
39 21 No. 2, pp. 384-400.
40
41
42 Dechow, P. M., Sloan, R. G., & Sweeney, A. P. (1995). Detecting earnings
43 management. *Accounting Review*, Vol. 70, No.2, pp. 193-225.
44
45 Deloitte (2022). Women in the boardroom: A global perspective. 7th edition. Retrieved from
46 [https://www2.deloitte.com/sg/en/pages/risk/articles/women-in-the-boardroom-global-](https://www2.deloitte.com/sg/en/pages/risk/articles/women-in-the-boardroom-global-perspective-seventh-edition.html)
47 [perspective-seventh-edition.html](https://www2.deloitte.com/sg/en/pages/risk/articles/women-in-the-boardroom-global-perspective-seventh-edition.html). Accessed September 13, 2022.
48
49
50 Ding, S., Knight, J. & Zhang, X. (2019), Does China overinvest? Evidence from a panel of
51 Chinese firms. *The European Journal of Finance*, Vol. 25 No. 6, pp. 489-507.
52
53
54 Doan, T., & Iskandar-Datta, M. (2020). Are female top executives more risk-averse or more
55 ethical? Evidence from corporate cash holdings policy. *Journal of Empirical*
56 *Finance*, Vol. 55, pp. 161-176.
57
58
59 Eckel, C. C., & Grossman, P. J. (2001). Chivalry and solidarity in ultimatum games. *Economic*
60 *Inquiry*, Vol. 39 No. 2, pp. 171-188.

- 1
2
3 Eissa, A. M., Elgendy, T., & Diab, A. (2023). Earnings management, institutional ownership
4 and investment efficiency: evidence from a developing country. *Journal of Financial*
5 *Reporting and Accounting*, Vol. ahead-of-print, pp. 1985-2517
6
7
8 Ertug, G., Brennecke, J., Kovács, B., & Zou, T. (2022). What does homophily do? A review
9 of the consequences of homophily. *Academy of Management Annals*, Vol. 16 No. 1, pp.
10 38-69.
11
12 Faccio, M., Masulis, R., & McConnell, J. J. (2006). Political connections and corporate
13 bailouts. *Journal of Finance*, Vol. 61 No. 6, pp. 2597–2635.
14
15 Farooq, M. U., Su, K., Boubaker, S., & Gull, A. A. (2022). Does gender promote ethical and
16 risk-averse behavior among CEOs? An illustration through related-party
17 transactions. *Finance Research Letters*, Vol. 47, 102730.
18
19 Farooq, S., Gan, C., & Nadeem, M. (2023). Boardroom gender diversity and investment
20 inefficiency: New evidence from the United Kingdom. *Corporate Governance: An*
21 *International Review*, Vol. 31 No. 1, pp. 2-32.
22
23 Ferris, S. P., & Sainani, S. (2021). Do CFOs matter? Evidence from the M&A process. *Journal*
24 *of Corporate Finance*, Vol. 67, pp. 101856.
25
26 Firk, S., Schmidt, T., & Wolff, M. (2019). CFO emphasis on value-based management:
27 performance implications and the challenge of CFO succession. *Management Accounting*
28 *Research*, Vol. 44, pp. 26-43.
29
30 Florackis C, & Sainani S (2018). How do chief financial officers influence corporate cash
31 policies? *Journal of Corporate Finance*, Vol. 52, pp. 168–191.
32
33 Francis, B., Hasan, I., & Wu, Q. (2013). The impact of CFO gender on bank loan
34 contracting. *Journal of Accounting, Auditing & Finance*, Vol. 28 No. 1, pp. 53-78.
35
36 Francis, B., Hasan, I., Park, J. C., & Wu, Q. (2015). Gender differences in financial reporting
37 decision making: evidence from accounting conservatism. *Contemporary Accounting*
38 *Research*, Vol. 32 No. 3, pp. 1285-1318.
39
40 García, C. J., & Herrero, B. (2021). Female directors, capital structure, and financial
41 distress. *Journal of Business Research*, Vol. 136, pp. 592-601.
42
43 Ge, W., Matsumoto, D., & Zhang, J. L. (2011). Do CFOs have style? An empirical
44 investigation of the effect of individual CFOs on accounting practices. *Contemporary*
45 *Accounting Research*, Vol. 28 No. 4, pp. 1141-1179.
46
47 Gist, W. E., & Abdul Wahab, E. A. (2021). Political patronage, audit quality, and the properties
48 of analysts' earnings forecasts in Malaysia. *Journal of International Accounting*
49 *Research*, Vol. 20 No. 1, pp. 49-78.
50
51
52
53
54
55
56
57
58
59
60

- 1
2
3 Gomez, E. T. (2007). The state, governance, and corruption in Malaysia. In *Corruption and*
4 *good governance in Asia* (pp. 214-244). Routledge.
5
6
7 Graham, J. R., Harvey, C. R., & Puri, M. (2013). Managerial attitudes and corporate
8 actions. *Journal of Financial Economics*, Vol. 109 No. 1, pp. 103-121.
9
10 Grant Thornton (2022). Women in business 2022.
11 [https://www.grantthornton.global/en/insights/women-in-business-2023/Women-take-a-](https://www.grantthornton.global/en/insights/women-in-business-2023/Women-take-a-leading-role/)
12 [leading-role/](https://www.grantthornton.global/en/insights/women-in-business-2023/Women-take-a-leading-role/) Accessed August 1, 2023. Greig, F., & Bohnet, I. (2009). Exploring gendered
13 behavior in the field with experiments: Why public goods are provided by women in a
14 Nairobi slum. *Journal of Economic Behavior & Organization*, Vol. 70 No. 1-2, pp. 1-9.
15
16
17
18 Grossman, A., Naaman, C., & Sahyoun, N. (2022). CFO gender in curbing CEO dominance
19 on overpriced acquisition premiums. *Managerial Finance*, Vol. 48 No. 3, pp. 373-391.
20
21 Guest, P. M. (2009). The impact of board size on firm performance: Evidence from the U.K.
22 *The European Journal of Finance*, Vol. 15 No. 4, pp. 385-404.
23
24
25
26 Gul, F. A. (2006). Auditors' response to political connections and cronyism in
27 Malaysia. *Journal of Accounting Research*, Vol. 44 No. 5, pp. 931-963.
28
29
30 Gull, A. A., Nekhili, M., Nagati, H., & Chtioui, T. (2018). Beyond gender diversity: How
31 specific attributes of female directors affect earnings management. *The British Accounting*
32 *Review*, Vol. 50 No.3, pp. 255-274.
33
34
35 Gupta, V. K., Mortal, S., Chakrabarty, B., Guo, X., & Turban, D. B. (2020). CFO gender and
36 financial statement irregularities. *Academy of Management Journal*, Vol. 63 No. 3, pp.
37 802-831.
38
39
40 Ham, C., Lang, M., Seybert, N., & Wang, S. (2017). CFO narcissism and financial reporting
41 quality. *Journal of Accounting Research*, Vol. 55 No. 5, pp. 1089-1135.
42
43
44
45 Hambrick, D. C., & Mason, P. A. (1984). Upper echelons: The organisation as a reflection of
46 its top managers. *Academy of Management Review*, Vol. 9 No. 2, pp. 193-206.
47
48 Han, D., Liu, Q., Wei, Z., & Hao, Y. (2022). Are female CFOs trailblazers or sustainers?
49 Evidence from industry growth prospects in China. *Asia-Pacific Journal of Accounting &*
50 *Economics*, Vol. 29 No. 4, pp. 1004-1024.
51
52
53
54 Harjoto, M. A., Laksmana, I., & Yang, Y. W. (2018). Board diversity and corporate investment
55 oversight. *Journal of Business Research*, Vol. 90, pp. 40-47.
56
57
58 Hasan, I., Nguyen, T., & Park, J. C. (2023). Female CFOs and Stock Price Crash Risk. *Review*
59 *of Business*, Vol. 43 No. 1, pp. 63-90.
60

- 1
2
3 He, Y., Chen, C., & Hu, Y. (2019). Managerial overconfidence, internal financing, and
4 investment efficiency: Evidence from China. *Research in International Business and*
5 *Finance*, Vol. 47, pp. 501-510.
6
7
8 Hirschman, C. (2016). Gender, the status of women, and family structure in Malaysia.
9 *Malaysian Journal of Economic Studies*, Vol.53 No.1, pp. 33–50.
10
11
12 Hoitash, R., Hoitash, U., & Kurt, A. C. (2016). Do accountants make better chief financial
13 officers?. *Journal of Accounting and Economics*, Vol. 61 No. 2-3, pp. 414-432.
14
15
16 Hubbard, R. G. (1998). Capital-market imperfections and investment. *Journal of Economic*
17 *Literature*, Vol. 36 No. 1, pp. 193– 225.
18
19
20 Hurley, D., & Choudhary, A. (2016). Factors influencing attainment of CEO position for
21 women. *Gender in Management: An International Journal*, Vol. 31 No. 4, pp. 250-265.
22
23
24 Hurley, D., & Choudhary, A. (2020). Role of gender and corporate risk taking. *Corporate*
25 *Governance: The International Journal of Business in Society*, Vol. 20 No. 3, pp. 383-
26 399.
27
28
29 Ibarra, H. (1992). Homophily and differential returns: Sex differences in network structure and
30 access in an advertising firm. *Administrative Science Quarterly*, Vol. 37 No. 3, pp. 422-
31 447.
32
33
34 Indjejikian, R., & Matějka, M. (2009). CFO fiduciary responsibilities and annual bonus
35 incentives. *Journal of Accounting Research*, No. 47 Vol. 4, pp. 1061-1093.
36
37
38 Irwin, K., Edwards, K., & Tamburello, J. A. (2015). Gender, trust and cooperation in
39 environmental social dilemmas. *Social Science Research*, Vol. 50, pp. 328-342.
40
41
42 Ismail, I., Shafie, R., & Ku Ismail, K. N. I. (2021). CFO attributes and accounting
43 conservatism: evidence from Malaysia. *Pacific Accounting Review*, Vol. 33 No. 4, pp.
44 525-548.
45
46
47 Johl, S. K., Kaur, S., & Cooper, B. J. (2015). Board characteristics and firm performance:
48 Evidence from Malaysian public listed firms. *Journal of Economics, Business and*
49 *Management*, Vol. 3 Vol. 2, pp. 239-243.
50
51
52 Kang, Y. J., Lee, H. Y., Park, H. Y., & Park, J. H. (2022). Social ties, managerial
53 overconfidence, and investment efficiency. *Finance Research Letters*, Vol. 46, pp.
54 102300.
55
56
57 Kim, K. (2015). Cooperation or competition? Gender stereotyping and interaction within
58 female duos. *Academy of Management Annual Meeting Proceedings*, Vol. 1, pp. 1–1.
59
60

- 1
2
3 Koenig, A. M., Eagly, A. H., Mitchell, A. A., & Ristikari, T. (2011). Are leader stereotypes
4 masculine? A meta-analysis of three research paradigms. *Psychological Bulletin*, Vol. 137
5 No. 4, pp. 616-642.
- 6
7 Konrad, A. M., Kramer, V., & Erkut, S. (2008). The impact of three or more women on
8 corporate boards. *Organisational Dynamics*, Vol. 37 Vol. 2, pp. 145-164.
- 9
10 Kunze, A., & Miller, A. R. (2017). Women helping women? Evidence from private sector data
11 on workplace hierarchies. *Review of Economics and Statistics*, Vol. 99 No. 5, pp. 769-775.
- 12
13
14 La Rocca, M., Neha, N., & La Rocca, T. (2020). Female management, overconfidence and debt
15 maturity: European evidence. *Journal of Management and Governance*, Vol. 24, pp. 713-
16 747.
- 17
18
19 Lai, S. M., & Liu, C. L. (2018). Management characteristics and corporate investment
20 efficiency. *Asia-Pacific Journal of Accounting & Economics*, Vol. 25 No. 3-4, pp. 295-
21 312.
- 22
23
24 Lai, S. M., Liu, C. L., & Chen, S. S. (2020). Internal control quality and investment
25 efficiency. *Accounting Horizons*, Vol. 34 No. 2, pp. 125-145.
- 26
27
28 Larcker, D. F., & Rusticus, T. O. (2010). On the use of instrumental variables in accounting
29 research. *Journal of Accounting and Economics*, Vol. 49 No. 3, pp. 186-205.
- 30
31
32 Larkin, J. E., & Pines, H. A. (2003). Gender and risk in public performance. *Sex Roles*, Vol.
33 49, pp. 197-210.
- 34
35
36 Lenard, J. M., Yu, B., Anne York, E., & Wu, S. (2014). Impact of board gender diversity on
37 firm risk. *Managerial Finance*, Vol. 40 No. 8, pp. 787-803.
- 38
39
40 Lennox, C. S., Francis, J. R., & Wang, Z. (2012). Selection models in accounting research. *The*
41 *Accounting Review*, Vol. 87 No. 2, pp. 589-616.
- 42
43
44 Levi, M., Li, K., & Zhang, F. (2014). Director gender and mergers and acquisitions. *Journal of*
45 *Corporate Finance*, Vol. 28, pp. 185-200.
- 46
47
48 Liao, J., Smith, D., & Liu, X. (2019). Female CFOs and accounting fraud: evidence from
49 China. *Pacific-Basin Finance Journal*, Vol. 53, pp. 449-463.
- 50
51
52 Liu, Y., Gan, H., & Karim, K. (2021). The effectiveness of chief financial officer board
53 membership in improving corporate investment efficiency. *Review of Quantitative*
54 *Finance and Accounting*, Vol. 57 No. 2, pp. 487-521.
- 55
56
57 Liu, Y., Neely, P., & Karim, K. (2022). The impact of CFO gender on corporate
58 overinvestment. *Advances in Accounting*, Vol. 57, pp. 100599.
- 59
60
Liu, Y., Wei, Z., & Xie, F. (2016). CFO gender and earnings management: Evidence from
China. *Review of Quantitative Finance and Accounting*, Vol. 46, No. 881-905.

- 1
2
3 Luo, J. H., Peng, C., & Zhang, X. (2020). The impact of CFO gender on corporate fraud:
4 Evidence from China. *Pacific-Basin Finance Journal*, Vol. 63, pp. 101404.
5
6 Malaysian Code on Corporate Governance (2021). Retrieved from
7 [https://www.sc.com.my/api/documentms/download.ashx?id=239e5ea1-a258-4db8-a9e2-](https://www.sc.com.my/api/documentms/download.ashx?id=239e5ea1-a258-4db8-a9e2-41c215bdb776)
8 [41c215bdb776](https://www.sc.com.my/api/documentms/download.ashx?id=239e5ea1-a258-4db8-a9e2-41c215bdb776)
9
10
11 Malmendier, U., & Tate, G. (2005). CEO overconfidence and corporate investment. *The*
12 *Journal of Finance*, Vol. 60 No. 6, pp. 2661-2700.
13
14
15 Marmaros, D., & Sacerdote, B. (2006). How do friendships form? *The Quarterly Journal of*
16 *Economics*, Vol. 121 No.1, pp. 79–119.
17
18
19 Matsa, D. A., & Miller, A. R. (2011). Chipping away at the glass ceiling: gender spillovers in
20 corporate leadership. *American Economic Review*, Vol. 101 No. 3, pp. 635-39.
21
22
23 McNichols, M. R., & Stubben, S. R. (2008). Does earnings management affect firms'
24 investment decisions? *The Accounting Review*, Vol. 83 No. 6, pp. 1571-1603.
25
26
27 McPherson, M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a feather: Homophily in social
28 networks. *Annual Review of Sociology*, Vol. 27, pp. 415-444.
29
30
31 McVay, S. E. (2006). Earnings management using classification shifting: An examination of
32 core earnings and special items. *The Accounting Review*, Vol.81 No.3, pp. 501-531.
33
34 Ministry of Women, Family and Community Development Malaysia (MWFCD). 2011.
35 Dasar 30% Wanita Peringkat Pembuat Keputusan. Retrieved from www.kpwkm.gov.my/
36
37
38 Niederle, M., & Vesterlund, L. (2007). Do women shy away from competition? Do men
39 compete too much? *The Quarterly Journal of Economics*, Vol. 122 No. 3, pp. 1067-1101.
40
41
42 Palvia, A., Vähämaa, E., & Vähämaa, S. (2015). Are female CEOs and chairwomen more
43 conservative and risk averse? Evidence from the banking industry during the financial
44 crisis. *Journal of Business Ethics*, Vol. 131, pp. 577-594.
45
46
47 Raghu A., & Shukry A. (2021). Malaysia mandates companies to have at least one women
48 director. Bloomberg Asia Edition. Retrieved from
49 [https://www.bloomberg.com/news/articles/2021-10-29/malaysia-mandates-companies-](https://www.bloomberg.com/news/articles/2021-10-29/malaysia-mandates-companies-to-have-at-least-one-woman-director)
50 [to-have-at-least-one-woman-director](https://www.bloomberg.com/news/articles/2021-10-29/malaysia-mandates-companies-to-have-at-least-one-woman-director). Accessed August 20, 2022
51
52
53 Rajkovic, T. (2020). Lead independent directors and investment efficiency. *Journal of*
54 *Corporate Finance*, Vol. 64, 101690.
55
56
57 Richardson, S. (2006). Over-investment of free cash flow. *Review of Accounting Studies*, Vol.
58 11 No. 2, pp. 159-189
59
60

- 1
2
3 Rogers, E. M., & Kincaid, D. L. (1981). *Communication networks: Toward a new paradigm*
4 *for research*. Free Press.
5
6
7 Rosenbaum, P. R., & Rubin, D. B. (1983). The central role of the propensity score in
8 *observational studies for causal effects*. *Biometrika*, Vol. 70 No. 1, pp. 41–55.
9
10
11 Sah, N. B., Adhikari, H. P., Krolikowski, M. W., Malm, J., & Nguyen, T. T. (2022). CEO
12 *gender and risk aversion: Further evidence using the composition of firm’s cash*. *Journal*
13 *of Behavioral and Experimental Finance*, Vol. 33, pp. 100595.
14
15
16 Saleh, N. M., & Sun, X. W. (2021). The influence of female directors proportion on investment
17 *efficiency: the mediating role of caution*. *Gender in Management: An International*
18 *Journal*, Vol. 37 No. 3, pp. 289-304.
19
20
21 Scharfstein, D. S., and J. C. Stein. 2000. The dark side of internal capital markets: Divisional
22 *rent-eeeking and inefficient investment*. *The Journal of Finance*, Vol. 55 No. 6, pp. 2537–
23 2564.
24
25
26 Schei, V., & Rognes, J. K. (2019). Female groups are not like others? Effects of gender
27 *composition on intergroup cooperation*. *Beta*, Vol. 33 No. 1, pp. 7–21.
28
29
30 Schopohl, L., Urquhart, A., & Zhang, H. (2021). Female CFOs, leverage and the moderating
31 *role of board diversity and CEO power*. *Journal of Corporate Finance*, Vol. 71, pp.
32 101858.
33
34
35 Securities Commission Malaysia (2021). *Corporate governance monitor 2021*
36 <https://www.sc.com.my/regulation/corporate-governance>
37
38
39 Shahab, Y., Ntim, C. G., Ullah, F., Yugang, C., & Ye, Z. (2020). CEO power and stock price
40 *crash risk in China: Do female directors’ critical mass and ownership structure*
41 *matter?*. *International Review of Financial Analysis*, Vol. 68, pp. 101457.
42
43
44 Shin, Y. Z., Chang, J. Y., Jeon, K., & Kim, H. (2020). Female directors on the board and
45 *investment efficiency: evidence from Korea*. *Asian Business & Management*, Vol. 19 No.
46 4, pp. 438-479.
47
48
49 Soll, J. B., & Klayman, J. (2004). Overconfidence in interval estimates. *Journal of*
50 *Experimental Psychology: Learning, Memory, and Cognition*, Vol. 30 No. 2, pp. 299-314.
51
52
53 Srinidhi, B. I. N., Gul, F. A., & Tsui, J. (2011). Female directors and earnings
54 *quality*. *Contemporary Accounting Research*, Vol. 28 No. 5, pp. 1610-1644.
55
56
57 Stulz, R. (1990). Managerial discretion and optimal financing policies. *Journal of financial*
58 *Economics*, Vol.26 No.1, pp. 3-27.
59
60

- 1
2
3 Sussangkarn, C., Park, Y C. & Kang, S J. (2011). Foreign Direct Investment in Asia. Routledge
4 (Taylor & Francis Group).
5
6
7 Tee, C. M., Gul, F. A., Foo, Y.-B., & Teh, C. G. (2017). Institutional monitoring, political
8 connections and audit fees: Evidence from Malaysian firms. *International Journal of*
9 *Auditing*, Vol. 21 No. 2, pp. 164–176.
10
11 Tran, Q. T. (2019). Independent directors and corporate investment: evidence from an
12 emerging market. *Journal of Economics and Development*, Vol. 21 No. 1, pp. 30-41.
13
14 Trong, N. N., & Nguyen, C. T. (2020). Firm performance: the moderation impact of debt and
15 dividend policies on overinvestment. *Journal of Asian Business and Economic Studies*,
16 Vol. 28 No. 1, pp. 47-63.
17
18 Ullah, I., Majeed, M. A., & Fang, H. X. (2021). Female CEOs and corporate investment
19 efficiency: Evidence from China. *Borsa Istanbul Review*, Vol. 21 No. 2, pp. 161-174.
20
21 Ullah, I., Majeed, M. A., Fang, H. X., & Khan, M. A. (2020ba). Female CEOs and investment
22 efficiency: evidence from an emerging economy. *Pacific Accounting Review*, Vol. 32 No.
23 4, pp. 443-474.
24
25 Ullah, I., Zeb, A., Khan, M. A., & Xiao, W. (2020ba). Board diversity and investment
26 efficiency: evidence from China. *Corporate Governance: The International Journal of*
27 *Business in Society*, Vol. 20 No. 6, pp. 1105-1134.
28
29 Wang, H., Luo, T., Tian, G. G., & Yan, H. (2020). How does bank ownership affect firm
30 investment? Evidence from China. *Journal of Banking & Finance*, Vol. 113, pp. 105741.
31
32 Wangrow, D. B., Schepker, D. J., & Barker III, V. L. (2015). Managerial discretion: An
33 empirical review and focus on future research directions. *Journal of Management*, Vol. 41
34 No. 1, pp. 99-135.
35
36 Wong, W. Y., & Hooy, C. W. (2018). Do types of political connection affect firm performance
37 differently? *Pacific-Basin Finance Journal*, Vol. 51, pp. 297-317.
38
39 Xie, J. (2015). CEO career concerns and investment efficiency: Evidence from
40 China. *Emerging Markets Review*, Vol. 24, pp. 149-159.
41
42 Xing, L., Gonzalez, A., & Sila, V. (2021). Does cooperation among women enhance or impede
43 firm performance? *The British Accounting Review*, Vol. 53 No. 4, 100936.
44
45 Xu, X., Li, W., Li, Y., & Liu, X. (2019). Female CFOs and corporate cash holdings:
46 precautionary motive or agency motive?. *International Review of Economics &*
47 *Finance*, Vol. 63, pp. 434-454.
48
49 Yu, C. (2023). Board gender diversity and investment inefficiency. *Journal of Economics and*
50 *Business*, Vol. 124, 106107.
51
52
53
54
55
56
57
58
59
60

- 1
2
3 Zalata AM, Ntim CG, Choudhry T, Hassanein A, Elzahar H (2019a). Female directors and
4 managerial opportunism: Monitoring versus advisory female directors. *The Leadership*
5 *Quarterly*, Vol. 30 No. 5, 101309
6
7
8 Zalata, A. M., & Abdelfattah, T. (2021). Non-executive female directors and earnings
9 management using classification shifting. *Journal of Business Research*, Vol. 134, pp.
10 301-315.
11
12 Zalata, A. M., Ntim, C., Aboud, A., & Gyapong, E. (2019b). Female CEOs and core earnings
13 quality: new evidence on the ethics versus risk-aversion puzzle. *Journal of Business*
14 *Ethics*, Vol. 160 No. 2, pp. 515-534.
15
16
17
18 Zhang, Y., Guo, Y., & Nurdazym, A. (2023). How do female CEOs affect corporate
19 environmental policies?. *Corporate Social Responsibility and Environmental*
20 *Management*, Vol. 30 No. 1, pp. 459-472.
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Table 1: Operational definition

Variables	Definitions	Source(s)
<i>Panel A: Dependent Variables</i>		
<i>EFFINV</i>	Investment efficiency measured by absolute investment inefficiency multiplied by -1	Compustat
<i>Panel B: Independent Test Variables</i>		
<i>FCFO</i>	Female CFO that takes on the value of 1 if female, zero otherwise.	Annual report
<i>FBOARD</i>	Proportion of female directors. Total number of female directors divided by total number of directors on the board.	Annual report
<i>Panel C: Independent Control Variables</i>		
<i>BSIZE</i>	Total number of directors on the board.	Annual report
<i>LBSIZE</i>	Natural log transformation of <i>BSIZE</i> .	Annual report
<i>INED</i>	Proportion of independent directors. Total number of independent directors divided by total number of directors on the board.	Annual report
<i>CF</i>	Cash flow from operation divided by lag total assets.	Compustat
<i>TANG</i>	Net property, plant and equipment to lag total assets.	Compustat
<i>LEV</i>	Leverage, measured as total debt scaled by total assets.	Compustat
<i>FSIZE</i>	Lag total assets.	Compustat
<i>LFSIZE</i>	Natural log transformation of lag total assets.	Compustat
<i>DIV</i>	Cash dividend that takes on the value of 1 if firms pay, zero otherwise.	Compustat
<i>INSTOWN</i>	The proportion of institutional ownership in the firm.	Orbis
<i>LOSS</i>	Sum of earnings before extraordinary items is negative takes the value of 1 if loss, zero otherwise.	Compustat
<i>BUMI</i>	Proportion of Bumiputera directors. Total number of Bumiputera directors divided by total number of directors on the board.	Annual report
<i>PCON</i>	Political connection firms takes the value of 1 if have connection, zero otherwise.	Wong and Hooy (2018)/Year 2019 and 2020 hand collected from annual reports
<i>CFOTENURE</i>	Total number of CFO years of service in the firm.	Annual report
<i>TENURE</i>	Natural log total number of CFO years of service in the firm.	Annual report
<i>BIG4</i>	An indicator variable that takes on the value of 1 if the auditor is a Big 4 international auditor, zero otherwise	Annual report
<i>ABSDA</i>	Absolute value of discretionary accruals estimated from the Modified Jones model.	Compustat
<i>Panel D: Exclusion Restriction for Self-selection test</i>		
<i>NUMEMPLOY</i>	Total number of employees	Compustat/firm's website/Bloomberg

The annual reports were downloaded from Bursa Malaysia's website.

Table 2: Descriptive Statistics (2016-2020, n=2,022)

Variable	Mean	SD	Min	Mdn	Max
<i>Panel A: Continuous Variables</i>					
<i>EFFINV</i>	-0.231	0.266	-1.616	-0.163	-0.003
<i>FBOARD</i>	0.150	0.130	0.000	0.140	0.630
<i>BSIZE</i>	7.260	1.810	3.000	7.000	16.000
<i>LBSIZE</i>	1.960	0.250	1.100	1.950	2.770
<i>INED</i>	0.510	0.130	0.170	0.500	1.000
<i>CF</i>	0.060	0.100	-0.330	0.050	0.550
<i>TANG</i>	0.350	0.230	0.000	0.320	0.990
<i>LEV</i>	0.100	0.120	0.000	0.050	0.580
<i>FSIZE (\$'000)</i>	3274.830	11463.500	3.040	494.930	180000.000
<i>LFSIZE</i>	6.390	1.610	1.110	6.200	12.090
<i>INSTOWN</i>	0.024	0.064	0.000	0.000	0.484
<i>BUMI</i>	0.310	0.280	0.000	0.220	1.000
<i>TENURE(YEAR)</i>	9.410	6.060	1.000	8.000	30.000
<i>TENURE</i>	2.020	0.680	0.000	2.080	3.400
<i>ASBDA</i>	0.060	0.070	0.000	0.040	0.370
<i>Panel B: Dummy variables</i>					
	Yes=1(%)	No=0(%)			
<i>FCFO</i>	687 (34%)	1335 (66%)			
<i>DIV</i>	1,188 (58.75%)	834 (41.25%)			
<i>LOSS</i>	537 (26.56%)	1,485 (73.44%)			
<i>PCON</i>	677 (33.48%)	1,345 (66.52%)			
<i>BIG4</i>	934 (46.19%)	1,088 (53.81%)			

Please refer to Table 1 for variables definition.

Table 3: Baseline regression (2016-2020, n=2,022)

	Predicted sign	1	2
<i>INTERCEPT</i>	+/-	-0.358*** (-4.430)	-0.338*** (-4.220)
<i>FCFO</i>	+	0.031*** (2.850)	-0.016 (-0.890)
<i>FBOARD</i>	+	-0.143*** (-3.090)	-0.268*** (-4.220)
<i>FCFO*FBOARD</i>	+		0.313*** (3.530)
<i>LBSIZE</i>	?	0.038* (1.340)	0.034 (1.200)
<i>INED</i>	+	0.085* (1.610)	0.089** (1.690)
<i>CF</i>	+	0.216*** (2.370)	0.215*** (2.390)
<i>TANG</i>	-	-0.164*** (-5.290)	-0.165*** (-5.340)
<i>LEV</i>	+	0.136** (2.240)	0.130** (2.130)
<i>LFSIZE</i>	+	-0.002 (-0.400)	-0.001 (-0.230)
<i>DIV</i>	+	0.039*** (3.030)	0.040*** (3.090)
<i>INSTOWN</i>	+	0.000 (0.840)	0.000* (1.570)
<i>LOSS</i>	-	-0.041*** (-2.650)	-0.039*** (-2.560)
<i>BUMI</i>	-	-0.063*** (-3.070)	-0.066*** (-3.210)
<i>PCON</i>	-	0.048*** (3.690)	0.045*** (3.410)
<i>TENURE</i>	+	0.030*** (3.390)	0.030*** (3.370)
<i>BIG4</i>	+	0.059*** (4.630)	0.059*** (4.650)
<i>ABSDA</i>	-	-0.207** (-2.480)	-0.211*** (-2.530)
<i>Industries and period fixed</i>		Included	Included
<i>Adj. R²</i>		0.150***	0.155***
<i>F-stat</i>		16.68***	15.83***
<i>N</i>		2,022	2,022

This table presents the result after adjusted heteroscedasticity and t-statistics(in parentheses). Please refer to Table 1 for a summary of operational definitions. ***,**,* denote significance at the 1%, 5% and 10% levels, respectively (one-tailed).

Table 4: Under and over-investment

<i>Panel A: Over-investment</i>		
	1	2
<i>INTERCEPT</i>	1.422*** (6.250)	1.397*** (6.180)
<i>FCFO</i>	-0.051*** (-2.770)	0.011 (0.390)
<i>FBOARD</i>	0.209*** (2.710)	0.401*** (3.400)
<i>FCFO*FBOARD</i>		-0.442*** (-2.880)
<i>Control variables</i>	Included	Included
<i>Industries and period fixed</i>	Included	Included
<i>Adj. R²</i>	0.205***	0.212***
<i>F-stat</i>	6.35***	6.26***
<i>N</i>	964	964
<i>Panel B: Under-investment</i>		
	1	2
<i>INTERCEPT</i>	-0.213*** (-3.440)	-0.244*** (-3.930)
<i>FCFO</i>	-0.006 (-0.580)	0.074*** (3.600)
<i>FBOARD</i>	0.126** (2.260)	0.325*** (4.090)
<i>FCFO*FBOARD</i>		-0.491*** (-4.550)
<i>Control variables</i>	Included	Included
<i>Industries and period fixed</i>	Included	Included
<i>Adj. R²</i>	0.403***	0.428***
<i>F-stat</i>	47.70***	49.06***
<i>N</i>	1,058	1,058

This table presents the result after adjusted heteroscedasticity and t-statistics(in parentheses). Panel A shows the result for over-investment, and Panel B shows the result for under-investment. Please refer to Table 1 for a summary of operational definitions. ***, **, * denote significance at the 1%, 5% and 10% levels, respectively (one-tailed).

Table 5: CEOs changes and switching CFOs

Panel A: Sample without CEOs changes		
	1	2
<i>INTERCEPT</i>	-0.176*** (-2.330)	-0.151** (-1.990)
<i>FCFO</i>	0.040*** (3.390)	-0.017 (-0.890)
<i>FBOARD</i>	-0.155*** (-2.960)	-0.318*** (-4.110)
<i>FCFO*FBOARD</i>		0.377*** (3.660)
<i>Control variables</i>	Included	Included
<i>Industries and period fixed</i>	Included	Included
<i>Adj. R²</i>	0.144***	0.153***
<i>F-stat</i>	13.79***	13.00***
<i>N</i>	1,595	1,595
Panel B: Female to male transition sample		
	1	2
<i>INTERCEPT</i>	-1.066** (-2.090)	-1.107** (-2.160)
<i>CFOTRANS</i>	-0.144* (-1.610)	-0.089 (-1.170)
<i>FBOARD</i>	-0.6124** (-1.760)	-0.418 (-0.260)
<i>CFOTRANS*FBOARD</i>		-0.391 (-0.840)
<i>Control variables</i>	Included	Included
<i>Industries and period fixed</i>	Included	Included
<i>Adj. R²</i>	0.289***	0.294***
<i>F-stat</i>	5.32***	5.56***
<i>N</i>	165	165

This table presents the result after adjusted heteroscedasticity and t-statistics (in parentheses). Panel A shows result excluding CEOs changes and Panel B shows result female-to-male CFO transitions. Please refer to Table 1 for a summary of operational definitions. ***, **, * denote significance at the 1%, 5% and 10% levels, respectively (one-tailed).

Table 6: Endogeneity: Heckman Selection Model and Propensity Score Matching

Panel A: Heckman-two stage selection model			
	First stage	Second stage	
		1	2
<i>INTERCEPT</i>	-0.564* (-1.370)	-0.335*** (-4.170)	-0.317*** (-3.980)
<i>FCFO</i>		0.031*** (2.800)	-0.016 (-0.900)
<i>FBOARD</i>	0.366* (1.600)	-0.152*** (-3.270)	-0.277*** (-4.330)
<i>FCFO*FBOARD</i>			0.312*** (3.520)
<i>NUMEMPLOY</i>	-0.019*** (-2.960)		
<i>IMR</i>		-0.033 (-1.080)	-0.030 (-1.020)
<i>Control variables</i>	Included	Included	Included
<i>Industries and period fixed</i>	Included	Included	Included
<i>Wald Chi</i>	66.57***		
<i>Adj.R2</i>		0.154***	0.156***
<i>F-stat</i>		16.19***	15.37***
<i>Obs with dep=0</i>	1,335		
<i>Obs with dep=1</i>	687		
Panel B: PSM-Using neighbour (5)			
		1	2
<i>INTERCEPT</i>		-0.372*** (-3.920)	-0.357*** (-3.780)
<i>FCFO</i>		0.024** (1.800)	-0.024 (-1.110)
<i>FBOARD</i>		-0.167**** (-2.990)	-0.294*** (-3.900)
<i>FCFO*FBOARD</i>			0.329*** (3.020)
<i>Control variables</i>		Included	Included
<i>Industries and period fixed</i>		Included	Included
<i>Adj. R²</i>		0.153***	0.162***
<i>F-stat</i>		11.66***	11.13***
<i>N</i>		1,449	1,449

Panel A shows the result of the first stage probit and z-statistic (in parentheses) and the second stage is the result after adjusted heteroscedasticity and t-statistics (in parentheses). Panel B shows the result of PSM t-statistics (in parentheses). Please refer to Table 1 for a summary of operational definitions. ***, **, * denote significance at the 1%, 5% and 10% levels, respectively (one-tailed).

Appendix A: Univariate analysis between female CFOs and male CFOs (2016-2020, n=2,022)

	FEMALE CFO (n=687)		MALE CFO (n=1,335)		t-test p-value	Mann- Whitney p-value
	MEAN	MEDIAN	MEAN	MEDIAN		
<i>EFFINV</i>	-0.203	-0.144	-0.246	-0.174	0.000	0.000
<i>FBOARD</i>	0.158	0.143	0.146	0.142	0.075	0.496
<i>LBSIZE</i>	1.943	1.945	1.962	1.945	0.102	0.176
<i>INED</i>	0.514	0.500	0.505	0.500	0.136	0.280
<i>CF</i>	0.064	0.060	0.055	0.048	0.064	0.005
<i>TANG</i>	0.351	0.319	0.348	0.325	0.786	0.617
<i>LEV</i>	0.100	0.047	0.095	0.047	0.329	0.792
<i>LFSIZE</i>	6.341	6.212	6.414	6.191	0.337	0.754
<i>DIV</i>	0.604	1.000	0.579	1.000	(0.278)	
<i>INSTOWN</i>	2.093	0.000	2.563	0.000	0.121	0.629
<i>LOSS</i>	0.242	0.000	0.277	0.000	(0.080)	
<i>BUMI</i>	0.273	0.167	0.323	0.250	0.000	0.000
<i>PCON</i>	0.350	0.000	0.327	0.000	(0.275)	
<i>TENURE</i>	2.102	2.079	1.984	2.079	0.000	0.000
<i>BIG4</i>	0.471	0.000	0.457	0.000	(0.530)	
<i>ABSDA</i>	0.063	0.039	0.064	0.039	0.905	0.886

Please refer to Table 1 for variables definitions. Significant p-values are bold. Chi-Square (χ^2) results are in parentheses.

Appendix B: Univariate analysis between PCON and non-PCON (2016-2020, n=2,022)

	PCON (n=677)		NONPCON (n=1,345)		t-test p-value	Mann- Whitney p-value
	Mean	Median	Mean	Median		
<i>EFFINV</i>	-0.203	-0.152	-0.246	-0.170	0.000	0.010
<i>FCFO</i>	0.355	0.000	0.332	0.000	(0.275)	
<i>FBOARD</i>	0.164	0.142	0.143	0.142	0.001	0.155
<i>LBSIZE</i>	2.016	1.945	1.926	1.945	0.000	0.000
<i>INED</i>	0.528	0.500	0.497	0.500	0.000	0.000
<i>CF</i>	0.054	0.048	0.061	0.053	0.165	0.269
<i>TANG</i>	0.372	0.358	0.340	0.308	0.002	0.005
<i>LEV</i>	0.121	0.071	0.085	0.039	0.000	0.000
<i>LFSIZE</i>	7.039	6.692	6.074	6.001	0.000	0.000
<i>DIV</i>	0.653	1.000	0.555	1.000	(0.000)	
<i>INSTOWN</i>	4.114	0.000	1.543	0.000	0.000	0.000
<i>LOSS</i>	0.239	0.000	0.279	0.000	(0.058)	
<i>BUMI</i>	0.391	0.333	0.263	0.200	0.000	0.000
<i>TENURE</i>	2.015	2.079	2.028	2.079	0.678	0.883
<i>BIG4</i>	0.480	0.000	0.453	0.000	(0.246)	
<i>ABSDA</i>	0.069	0.044	0.061	0.038	0.016	0.008

Please refer to Table 1 for the variables definitions. Significant p-values are bold. Chi-Square (χ^2) results are in parentheses.

Appendix C: Correlation analysis (2016-2020, n=2,022)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. <i>EFFINV</i>	1	0.101***	-0.030	0.004	-0.018	0.032	-0.171***	-0.065***	0.017	-0.151***	0.012	-0.160***	-0.151***	0.057**	0.133***	0.054**	0.062***
2. <i>FCFO</i>	0.076***	1	0.015	-0.030	0.024	0.063***	0.011	0.006***	-0.007	0.024	-0.011	-0.039*	-0.115***	0.024	0.085***	0.014	-0.003
3. <i>FBOARD</i>	-0.024	0.040*	1	0.068***	-0.001	0.111***	0.048**	0.090***	0.212***	0.168***	0.165***	-0.066***	0.017	0.032	-0.049**	0.181***	-0.011
4. <i>LBSIZE</i>	0.060***	-0.036	0.089***	1	-0.215***	0.108***	0.094***	0.198***	0.345***	0.223***	0.257***	-0.146***	0.129***	0.169***	-0.046**	0.154***	0.017
5. <i>INED</i>	-0.003	0.033	-0.032	-0.234***	1	-0.049**	-0.067***	0.071***	0.055**	-0.051**	0.051**	0.060***	0.262***	0.099***	-0.076***	0.012	0.034
6. <i>CF</i>	0.110***	0.040*	0.136***	0.091***	-0.047**	1	0.216***	-0.027	0.147***	0.375***	0.097***	-0.357***	-0.110***	-0.025	0.027	0.147***	0.012
7. <i>TANG</i>	-0.116***	0.006	0.057***	0.095***	-0.071***	0.176***	1	0.219***	-0.005	0.018	0.026	0.012	-0.076***	0.062***	-0.056**	0.076***	0.019
8. <i>LEV</i>	-0.001	0.022	0.162***	0.160***	0.073***	0.014	0.167***	1	0.410***	-0.026	0.186***	0.014	0.185***	0.160***	-0.149***	0.108***	0.043*
9. <i>LSIZE</i>	0.087***	-0.021	0.245***	0.384***	0.057***	0.142***	0.009	0.448***	1	0.351***	0.470***	-0.157***	0.224***	0.267***	-0.160***	0.464***	0.053**
10. <i>DIV</i>	0.171***	0.024	0.158***	0.249***	-0.066***	0.334***	0.004	0.004	0.357***	1	0.231***	-0.461***	-0.092***	0.094***	0.027	0.204***	0.011
11. <i>INSTOWN</i>	0.043	-0.034	0.138***	0.238***	0.039*	0.065**	-0.005	0.210***	0.431***	0.162***	1	-0.091***	0.234***	0.154***	-0.118***	0.274***	0.006
12. <i>LOSS</i>	-0.156***	-0.039*	-0.062***	-0.164***	0.087***	-0.298***	0.016	-0.021	-0.167***	-0.461***	-0.067***	1	0.110***	-0.042*	-0.097***	-0.050**	-0.054**
13. <i>BUMI</i>	-0.091***	-0.083***	0.024	0.128***	0.265***	-0.083***	-0.024	0.185***	0.245***	-0.081***	0.313***	0.112***	1	0.232***	-0.12***	0.073***	0.090***
14. <i>PCON</i>	0.077***	0.024	0.072***	0.173***	0.111***	-0.031	0.068***	0.136***	0.287***	0.094***	0.188***	-0.042*	0.214***	1	-0.003	0.026	0.059***
15. <i>TENURE</i>	0.105***	0.083***	-0.061***	-0.039*	-0.098***	-0.002	-0.064***	-0.146***	-0.150***	0.048**	-0.058***	-0.107***	-0.139***	-0.009	1	0.137***	-0.019
16. <i>BIG4</i>	0.116***	0.014	0.194***	0.160***	-0.003	0.156***	0.064***	0.140***	0.454***	0.204***	0.246***	-0.050**	0.111***	0.026	-0.119***	1	-0.016
17. <i>ABSDA</i>	0.052**	-0.003	-0.004	0.025	0.065***	0.023	0.036	0.037*	0.085***	0.017	0.033	-0.048**	0.078***	0.053**	-0.028	-0.010	1

Spearman-rank correlations are italicized. ***, **, * denote significance at 1%, 5% and 10% levels, respectively (two-tailed). Please refer to Table 1 for variables definition.

Correlation between exclusion restriction, dependent variable and independent variables

	1	2	3	4
1. <i>EFFINV</i>	1	<i>0.030</i>	<i>-0.101***</i>	<i>-0.009</i>
2. <i>FCFO</i>	0.075***	1	<i>0.015</i>	<i>-0.122***</i>
3. <i>FBOARD</i>	-0.024	0.039*	1	<i>0.191***</i>
4. <i>NUMEMPLOY</i>	-0.009	0.125***	-0.069***	1

Appendix D: Controlling for Covid-19 Year

	1	2
<i>INTERCEPT</i>	-0.355*** (-4.450)	-0.335*** (-4.240)
<i>FCFO</i>	0.031*** (2.850)	-0.016 (-0.890)
<i>FBOARD</i>	-0.142*** (-3.100)	-0.268*** (-4.230)
<i>FCFO*FBOARD</i>		0.313*** (3.530)
<i>COVIDDUM</i>	-0.002 (-0.110)	-0.001 (-0.040)
<i>Control variables</i>	Included	Included
<i>Industry effect</i>	Included	Included
<i>Adj. R²</i>	0.150***	0.155***
<i>F-stat</i>	18.50***	17.48***
<i>N</i>	2,022	2,022

This table presents the result after adjusted heteroscedasticity and t-statistics(in parentheses). Please refer to Table 1 for a summary of operational definitions. ***,**,* denote significance at the 1%, 5% and 10% levels, respectively (one-tailed).