Women on Boards and Firm Value: Do Related-Party Transactions Change the Outcome?

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ABSTRACT
The purpose of this study is to examine the influence of women on boards of directors (WOB) on firm value and to determine the moderating influence of related party transactions (RPTs) in the WOB-firm value relationship. This study uses 953 observations of firms-years from 218 manufacturing firms listed on the IDX from the period of 2018-2022. The dependent variable used is Tobin's Q, whereas the independent variables are the WOB. Related party transactions are examined through sales, purchases, and receivable-payable transactions with related parties. Technical analysis uses panel regression. Furthermore, the results show that RPT weaken the positive relationship between WOB and firm value, particularly for RPT sales and purchases. These findings suggest that the benefits of female representation on corporate boards may depend on the agency environment in which directors operate. The study contributes to the corporate governance literature by identifying RPT as a boundary condition in the relationship between female directors and firm value.

Keywords: Board Gender Diversity, Corporate Governance, Female Director, Firm Value, Related Party Transactions.

Introduction

Firm value is a central concern and one of the most important indicators of effective corporate management (Bolton, 2023). Even in management studies that do not directly examine firm value, it often remains the implicit outcome that companies seek to achieve. The results of corporate management are presented in financial statements and may subsequently be reflected in market share prices following their publication. Financial statements serve as an important communication medium for various stakeholders, particularly investors. Investors rely heavily on the information provided in financial statements before making investment decisions. As firm value is a primary objective of every firm, further research on this subject remains important. Previous studies have identified several factors that may improve firm value, including corporate governance (Tanjung, 2020), working capital management and board gender diversity (Hatane et al., 2023), and CEO characteristics (Suherman, 2023), among others.

Indonesia provides a relevant institutional setting for understanding the relationship between female executive, RPT, and firm value in emerging markets. Unlike many developed markets, Indonesian listed firms operate under a two-tier board system and are commonly characterised by concentrated and family ownership. Such traits could increase agency problems between controlling and minority stockholders and create more chances for controlling stockholders to have an impact on corporate deals (Ernawati & Aryani, 2019; Subastian et al., 2021).

These institutional characteristics are particularly important for understanding RPTs. In firms with concentrated ownership, RPTs may be used not only for legitimate business purposes but also to transfer resources or provide private benefits to controlling shareholders. Previous studies in Indonesia show that RPTs are associated with agency conflicts, earnings management, tax avoidance, and potential losses to minority shareholders (Nuritomo et al., 2020; Subastian et al., 2021; Abigail & Dharmastuti, 2022).

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This setting is also relevant to the international debate on whether greater female representation on corporate boards improves firm value. International and Indonesian studies provide mixed evidence on this relationship, suggesting that the benefits of female directors may depend on the institutional and governance environment in which they operate (Pasaribu, 2019; Pangestu et al., 2019; Tjondro et al., 2020; Natalia & Isnalita, 2024). Therefore, examining Indonesia can provide insights into whether the governance benefits of female directors remain effective when firms face greater agency risks arising from RPTs. The findings are therefore relevant beyond Indonesia. Many emerging economies share characteristics such as concentrated ownership, family-controlled firms, weaker separation between ownership and control, and extensive business relationships among affiliated firms. Evidence from Indonesia can consequently improve our understanding of why female board representation may enhance firm value in some institutional settings but have weaker effects in others.

The impact of women occupying positions within corporations on the performance of financial corporations in Indonesia was analysed in prior literature (Tjondro et al., 2020). The finding was that the presence of women on boards of directors influences firm value positively. This topic has also gained great importance in corporate governance (Ahmed and Hussain, 2024). The involvement of women in corporate leadership is important in Indonesia, as there are many women who occupy positions of high-level management, including directors (Manurung et al., 2020).

The growing attention given to gender diversity and gender equality has been accompanied by an increase in the number of women serving on corporate boards (Gull et al., 2018). Previous studies argue that women and men differ in how they think and behave (Farooq et al., 2022). In corporate settings, these differences can be observed in leadership styles, work ethics, risk preferences, and decision-making approaches (Lee and Thong, 2022). Consequently, male and female directors may have different effects on firm value. However, previous studies have produced mixed findings, suggesting that female board representation may have either a positive or negative effect on firm value. Women are said to be more ethical and less risky than their male counterparts in terms of being leaders (Zalata et al., 2019). Women are also said to be more patient, tolerant, able to multitask, and have more education (Ahmad, 2019). In addition, Ullah et al. (2019) posit that having women at the helm of companies improves corporate governance, reduces agency problems, and increases firm value. These positive views on the role of women in management are also supported by the research findings of Sattar et al. (2023), Lee et al. (2022), and Mahsina et al. (2022), who found a positive association between women's board presence and firm value.

On the other hand, some research opposes the notion that female board representation enhances firm value. As mentioned by Khan et al. (2019), women are risk-averse when compared to their male counterparts. The fact that women sit in boards of directors makes it easier for firms to come up with conservative strategies rather than innovative ones. The idea is supported by the research conducted by Lim et al. (2019), which found out that female board representation negatively impacts firm value. Another factor that may affect firm value is the use of RPTs. RPTs are commonly undertaken by firms (Wulandari, 2022). Indonesian SFAS No. 7 (2010) states that a related party is an individual or organisation that is related to the entity preparing their financial statements. Individuals/organisations will be related parties if one has the ability to control or significantly influence another or if the two parties are under common control and influence (Wulandari, 2022). An RPT therefore occurs when a transaction takes place between related parties. According to Marchini et al. (2019), concerns regarding RPTs have received increasing attention over the past two decades.

RPTs may be viewed as a strategy that can destroy firm value (Marchini et al., 2019). Agency Theory assumes that individuals may behave opportunistically and seek to maximise their personal benefits (Fooladi & Farhadi, 2019). Directors may therefore use RPTs to misappropriate corporate assets or misrepresent the firm's financial statements

(Alsultan, 2023). Although RPTs are not necessarily harmful, they can easily be used to obtain private benefits and may increase the risk of collusion among related parties (Farooq, 2022).

Transactions with related parties may therefore affect a firm's overall performance. Although RPTs can be economically efficient, previous studies have highlighted various risks faced by firms that frequently engage in such transactions. The ISA 550 indicates that fraud can be easier committed within related party relationships and transactions. These risks may influence the effectiveness of boards in improving firm value. They may also make RPTs an important consideration for investors when assessing a firm and its performance. Accordingly, this study examines whether RPTs weaken or strengthen the relationship between female board representation and firm value.

The connection between board of directors' women representation and company performance has been widely analysed by previous researches, but still results are ambiguous. While some studies suggest that female directors improve firm value through stronger monitoring, lower agency costs, and more diverse decision-making, others report negative, insignificant, or context-dependent effects (Pangestu et al., 2019; Pasaribu, 2019; Tjondro et al., 2020; Natalia & Isnalita, 2024). These mixed findings suggest that the effect of female executives may depend on the governance and agency environment in which they operate. However, limited attention has been given to the conditions that may strengthen or weaken these performance benefits, particularly the agency risks arising from related-party transactions (RPTs). Previous studies have mainly examined RPTs as a direct determinant of firm value or firm value and have shown that RPTs may create opportunities for resource transfers, earnings management, and private benefits for controlling shareholders (Nuritomo et al., 2020; Subastian et al., 2021; Abigail & Dharmastuti, 2022). What remains less understood is whether RPTs affect the ability of female directors to contribute to firm value. This issue is especially pertinent to emerging markets, which tend to have concentrated and family ownership along with substantial transactions among affiliated companies, which can exacerbate the problem of agency costs. Hence, this research seeks to go beyond the straightforward connection between women executives and company performance by focusing on the role of RPTs as an intervening variable.

Literature Review

Resource Dependence Theory

Resource Dependence Theory provides an explanation for the relationship between woman directors and firm value. This theory regards the board of directors as one of the major sources of resource through which firm interface with the external environment. From this perspective, board diversity can provide firms with broader knowledge, skills, perspectives, networks, and access to external resources that support better strategic decisions (Nguyen et al., 2020). Woman directors may contribute different professional experience, stakeholder perspectives, and competencies that complement those of male directors, thereby increasing the resources available to the board and improving the quality of decision-making (Nguyen et al., 2020; Brahma et al., 2021). Previous studies further suggest that gender-diverse boards may strengthen firms' connections with stakeholders and provide additional information and perspectives that improve board effectiveness and firm value (Brahma et al., 2021; García-Blandón et al., 2025). Evidence from Indonesia also supports this perspective, showing that female directors can provide additional resources and perspectives that contribute positively to firm value and reduce corporate risk (Tjondro et al., 2020).

The presence of women in the business environment has long been widely discussed. Women on boards refers to female representation in corporate board positions. Female board representation has become an important factor within the highest levels of corporate leadership (Tjondro et al., 2020). Gender also plays an important role in the corporate workplace (Cambrea et al., 2022). Their participation may also provide firms with new skills and qualifications, improve their understanding of capital markets, and strengthen their corporate image, particularly among shareholders (Loukil et al., 2019). Female directors with strong accounting qualifications can apply their knowledge to improve firm value (Ahmad et al., 2019). Furthermore, female representation on boards may reduce agency costs (Lee and Thong, 2022), improve the openness and transparency of the corporate information environment (Li and Zeng, 2019), strengthen corporate networks and reduce dependence on external resources (Ahmed and Hussain, 2024), and reduce the likelihood of corporate fraud (Gupta et al., 2020).

Agency Theory

An agency relationship is an agreement in which shareholders give managers the authority to operate the firm and make decisions on their behalf. The assumption about human nature suggests that individuals are self-interested and seek to maximise their personal benefits (Alsultan, 2023).

The structure of boards in Indonesia is a two-tier structure, where the board of directors manages the firm's affairs. Directors also have greater access to information and opportunities to use RPTs. RPTs may be used by management to manipulate earnings and maximise personal benefits (Lin et al., 2022). Such transactions may create conflicts of interest between management and other corporate stakeholders (Alsultan, 2023). RPTs that exploit corporate resources may also increase moral hazard because they serve management's interests while disregarding potential losses to minority shareholders (Fooladi and Farhadi, 2019). Therefore, RPTs may increase agency costs and reduce firm value (Diab et al., 2019).

Related party transactions (RPTs) involve business dealings with related parties, for example, stockholders, associated companies, and subsidiaries (Wulandari et al., 2022). According to the International Accounting Standards Board, an RPT involves the transfer of resources, services, or obligations between related parties. These transactions take place between a firm and parties with an existing relationship, such as directors, commissioners, subsidiaries, or the immediate family members of these parties (Phung et al., 2023). RPTs may be used as a mechanism to exploit corporate resources (Phung et al., 2023). Therefore, other stakeholders are likely to consider RPTs an important factor when assessing a firm's financial statements (Alsultan, 2023). Opportunistic behaviour through RPTs may reduce firm value and, ultimately, firm value (Fooladi and Farhadi, 2019). Firms therefore disclose RPTs to provide external parties, particularly investors, with information about transactions conducted with parties that have special relationships with the firm (Firmansyah and Ardi, 2020).

Firms may use RPTs to transfer profits, for example, by conducting transactions with affiliated firms located in countries with lower tax rates or with affiliates in weaker financial positions (Susanti and Firmansyah, 2018). By transferring part of their profits, firms may report lower returns, resulting in lower dividends and tax payments. Although this practice may provide private benefits to majority shareholders, it can directly harm minority shareholders by reducing the dividends they receive. It may also harm the public because lower tax payments reduce the funds available for public purposes (Abigail and Dharmastuti, 2022).

Woman Directors and Firm value

Female representation on boards of directors may reduce agency conflicts by improving board dynamics and efficiency (Sattar et al., 2023). This effect may arise from differences between the characteristics of women and men. Previous studies suggest that women are more likely to comply with laws and regulations (Lee and Thong, 2022), adopt more conservative investment decisions (Chen et al., 2020), implement more conservative financial policies, and be less likely to manipulate financial statements (Gupta et al., 2020). Women are also generally considered more risk-averse and may therefore make more careful investment decisions. In other words, women and men tend to have different attitudes towards risk: women are commonly viewed as more reluctant to take risks, while men are viewed as greater risk-takers (Tjondro et al., 2020). These differences may lead to different effects on firm value.

The previous empirical research on the influence of woman directors on the value of firms has shown ambiguous results. There is some evidence to prove that woman directors can help improve the value of firms by lowering the agency costs (Lee and Thong, 2022). Woman directors can also decrease the cost of debt of firms (Pandey et al., 2019). Furthermore, improved board dynamics associated with female representation may reduce information asymmetry and corporate risk while improving firm value (Nadeem et al., 2019). Supporting this argument, firms in which women account for at least 40% of directors may obtain three times greater economic benefits than firms in which women account for only 20% of directors (Sattar et al., 2023).

In contrast, women's greater risk aversion may lead firms to make more conservative and less innovative decisions (Khan et al., 2020). This may limit the firm's ability to achieve rapid growth. Although female board representation may improve firm value, women's participation remains limited because they may have less experience, expertise, and access to professional networks (Hatane et al., 2022). Given the mixed findings of previous studies, this research contributes to the literature by examining the effect of female board representation on firm value. Therefore, the first hypothesis is formulated as follows:

H_1: Female representation on the board of directors has a positive effect on firm value.

Related-Party Transactions, Women on Boards of Directors, and Firm Value

RPTs can be viewed from two perspectives: efficient transactions and opportunistic transactions (Hendratama and Barokah, 2020). From the efficiency perspective, RPTs may provide economic benefits to firms. In contrast, the opportunistic perspective considers RPTs an agency problem involving conflicts of interest between managers and minority shareholders who are not involved in the transactions (Firmansyah and Ardi, 2020). Such conflicts arise when directors use corporate resources to serve their own interests without considering the consequences for shareholders (Abigail and Dharmastuti, 2022). Other stakeholders have limited access to information and may therefore be unable to determine whether a decision was made to support the firm's development or to serve management's personal interests (Rohi Mone et al., 2020).

These conflicts are common in developing countries such as Indonesia, where legal protection for minority shareholders remains relatively weak. This type of agency conflict is particularly common in several Asian countries, including Indonesia (Supatmi et al., 2019). One reason is the dominance of family ownership structures, which may make Indonesian firms more likely to conduct RPTs without adequately considering the potential losses to external parties (Habib et al., 2017).

RPTs may reduce both firm value and firm value (Abigail and Dharmastuti, 2022). They may negatively affect a firm's revenue, assets, and value (Chizema et al., 2020). The harmful effects of RPTs may result in losses for minority shareholders or facilitate tunnelling activities (Supatmi et al., 2019). Transactions with related parties may indirectly transfer benefits away from minority shareholders. Previous studies also show that RPTs may reduce corporate resources and thereby harm the firm (Phung et al., 2023). The transfer of resources to affiliated firms may reduce firm value and result in abnormal stock dividends (Abigail and Dharmastuti, 2022).

Further, the relationship party transaction refers to the exchange of assets, services or any obligation of the reporting party and the relationship party irrespective of whether there is a cost incurred on the transaction or not. Transfer pricing refers to determining the price of the transactions between the related parties. Here, when the transaction takes place between the company and the related party, the prices may be high or low relative to the independent parties. Such transactions may violate the principle of the arm's length. According to the arm's length principle, if the terms of the transaction between the related parties are similar to the transaction terms between unrelated parties, then the value or profit obtained by the transaction between the related parties should be equal or fall under the same range as the value or profit of the transaction between unrelated parties.

RPTs have been found to significantly affect firm value (Lee, 2019). The use of RPTs by management to obtain personal benefits is inconsistent with shareholders' interests (Lin et al., 2020). Therefore, RPTs may reduce shareholders' assessment of firm value and weaken firm value (Alsultan, 2023). Overall, previous studies suggest that RPTs negatively affect firm value. Accordingly, this study examines RPTs as a moderating variable that may weaken the relationship between female board representation and firm value. The second hypothesis is therefore formulated as follows:

H_2: RPT weaken the positive relationship between female representation on the board of directors and firm value.

Methodology

Sample Selection

The sample consists of manufacturing firms classified under US SIC 02 and 03 and listed on the Indonesia Stock Exchange (IDX) between 2018 and 2022. This study uses secondary data obtained from firms' annual reports and the Refinitiv database.

Initially, 252 manufacturing firms classified under SIC 02 and 03 were identified. Purposive sampling was then applied, and 34 firms that did not meet the selection criteria were excluded. The final sample consisted of 218 firms, producing 953 firm-year observations over the five-year period from 2018 to 2022.

Data for the WOB and WOB Dummy variables were obtained from the ESG Intelligence database. Seven companies did not have data on female representation on the board of directors and were therefore excluded from the sample. Data for the dependent and control variables were obtained from the Refinitiv database. A further 27 companies were excluded because the required data were unavailable. Data for the moderating variable were collected manually from the information disclosed in the firms' financial statements. The manually collected data were complete, although many firms did not conduct RPT. These firms generally stated in their annual financial statements that they had no RPT.

The sampling criteria were as follows:

1. Firms classified under US SIC 02 and 03 and listed on the IDX during the 2018–2022 period.
2. Firms operating in the manufacturing sector.
3. Firms that consistently published annual financial statements from 2018 to 2022.
4. Firms with complete information for all variables used in the study.
5. Firms that had been listed on the stock exchange for at least one year.

Table 1. Sampling

Sample Criterias	Totals
Manufacturing firms classified under SIC codes 02 and 03 listed on the Indonesia Stock Exchange (IDX) for the 2018–2022 period.	252
Firms that do not have complete information	34
The number of firms included in the research sample	218
Number of years of observation	5
Number of observations (unbalanced panel)	953

Table 2. Variables Definition

Variables	Abbreviation	Description
Independent Variables		
Women on Board of Director (Proportion)	WOB	Ratio of women directors, determined by the division of the number of women directors by the total number of directors serving on the board.
Women on Board of Director (Dummy)	WOB_DUMMY	Dummy variable representing board composition of women, where 1 indicates presence of at least one female director and 0 indicates absence of the same.
Dependent Variable		
Firm value	FV	Value of the firm will be evaluated using Tobin's Q index where Tobin's Q = Market value of equity + Book value of debt / Total assets.
Interaction Variables		
Related Party Transaction (Sales)	RPT_SALES	The value of sales transactions with related parties divided by total revenue.
Related Party Transaction (Purchase)	RPT_PURCHASE	The value of purchase transactions with related parties divided by total assets.
Related Party Transaction (Receivable-Payable)	RPT_RECEIVPAY	The value of receivables from related parties minus the value of payables to related parties, divided by total assets.
Control Variables		
Firm Size	SIZE	The size of the firm is measured by the natural log of total assets at year t.
Firm Age	AGE	The age of the firm is measured by the natural log of the number of years since the firm was listed on the stock market.
Leverage	LEV	Leverage is measured by debt to total assets ratio, which measures the percentage of firm assets funded through borrowing.
Profitability	ROA	Return on assets (ROA) is calculated by net income after tax to total assets.
Year	YEAR	Year t in which the financial statements of the firm are analysed from the year 2018 to 2022.

As the independent variable, female board is measured in two ways. First, it is measured as the proportion of woman directors, calculated by dividing the number of female directors by the total number of directors on the board. This measurement is consistent with previous studies (Lee and Thong, 2022; Manurung et al., 2020). Second, female board representation is measured using a dummy variable. The variable is assigned a value of 1 if the board has at least a woman director and 0 if it has no female directors. This measurement follows Sattar et al. (2023). Data on female directors and the total number of directors were collected manually from the firms' annual reports.

Dependent Variables

Tobin's Q is selected because it has been widely used to measure firm value in previous studies (Lee and Thong, 2022; Cheikh et al., 2022; Tjondro et al., 2020; Abigail and Dharmastuti, 2022; Supatmi et al., 2019). A Tobin's Q value greater than 1 indicates that investors have confidence in the firm and its growth prospects. In contrast, a value below 1 may indicate lower investor confidence and weaker growth prospects. Data on the market value of equity, book value of debt, and Tobin's Q were obtained from the Refinitiv database.

Interaction Variables

The moderating variable used for the association between women representation on the board of directors and company value in this study is RPT (related party transaction). The RPTs are quantified using the formulas used in previous studies (Habib et al., 2017). The data concerning sales, purchases, payables, and receivables transactions involving the related parties are gathered manually from the annual financial reports of manufacturing companies classified into SIC 02 and 03 operating at IDX.

Control Variables

Following the guidelines provided by Brahma et al. (2021), this research uses multiple control variables based on the characteristics of the firm: firm age, firm size, leverage, profitability, and year. The measure of firm age is the natural logarithm of the firm's years of operation in the Indonesia Stock Exchange. The measure of firm size is the natural logarithm of the firm's total assets. The leverage variable is the ratio of total debt to total assets. The profitability variable is also included as a control variable, which is in line with prior studies (Tjondro and Tjaraka, 2024; Manurung et al., 2020). Finally, the year dummy variable is included as a control variable. Data on all control variables were sourced from Refinitiv database.

Data Analysis Technique

This study uses panel data regression analysis. Before testing the hypotheses, the most appropriate panel regression model must be selected. In general, three panel regression models can be used: the CE model (CEM), the FE model (FEM), and the RE model (REM). The regression models used in this study are specified as follows:

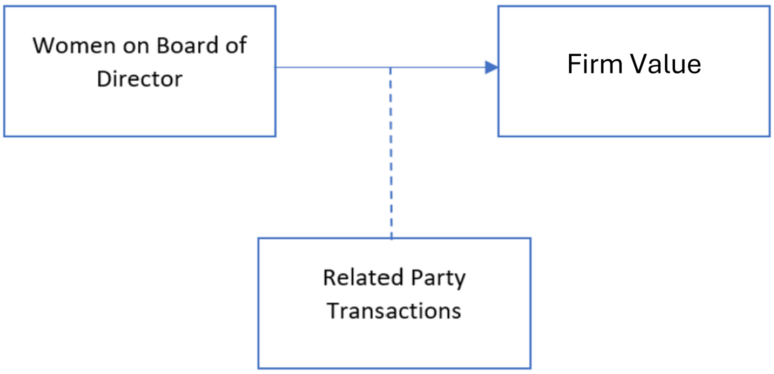

Figure 1. Framework

$$FV = \alpha + \beta 1\ WOB + \beta 2\ SIZE + \beta 3\ ROA + \beta 4\ LEV + \beta 5\ AGE + \beta 6\ YEAR + \mathscr{E} \quad (1A)$$

$$FV = \alpha + \beta 1\ WOB\_DUMMY + \beta 2\ SIZE + \beta 3\ ROA + \beta 4\ LEV + \beta 5\ AGE + \beta 6\ YEAR + \mathscr{E} \quad (1B)$$

$$FV = \alpha + \beta 1\ WOB + \beta 2\ RPT\_SALES + \beta 3\ WOB * RPT\_SALES + \beta 4\ SIZE + \beta 5\ ROA + \beta 6\ LEV + \beta 7\ AGE + \beta 8\ YEAR + \mathscr{E} \quad (2A)$$

$$FV = \alpha + \beta 1\ WOB + \beta 2\ RPT\_PURCHASE + \beta 3\ WOB * RPT\_PURCHASE + \beta 4\ SIZE + \beta 5\ ROA + \beta 6\ LEV + \beta 7\ AGE + \beta 8\ YEAR + \mathscr{E} \quad (2B)$$

$$FV = \alpha + \beta 1\ WOB + \beta 2\ RPT\_RECEIVPAY + \beta 3\ WOB * RPT\_RECEIVPAY + \beta 4\ SIZE + \beta 5\ ROA + \beta 6\ LEV + \beta 7\ AGE + \beta 8\ YEAR + \mathscr{E} \quad (2C)$$

$$FV = \alpha + \beta 1\ WOB\_DUMMY + \beta 2\ RPT\_SALES + \beta 3\ WOB\_DUMMY * RPT\_SALES + \beta 4\ SIZE + \beta 5\ ROA + \beta 6\ LEV + \beta 7\ AGE + \beta 8\ YEAR + \mathscr{E} \quad (2D)$$

$$FV = \alpha + \beta1\ WOB\_DUMMY + \beta2\ RPT\_PURCHASE + \beta3\ WOB\_DUMMY*RPT\_PURCHASE + \beta4\ SIZE + \beta5\ ROA + \beta6\ LEV + \beta7\ AGE + \beta8\ YEAR + \mathscr{E} \quad (2E)$$

$$FV = \alpha + \beta1\ WOB\_DUMMY + \beta2\ RPT\_RECEIVPAY + \beta3\ WOB\_DUMMY*RPT\_RECEIVPAY + \beta4\ SIZE + \beta5\ ROA + \beta6\ LEV + \beta7\ AGE + \beta8\ YEAR + \mathscr{E} \quad (2F)$$

Analysis and Discussion

Descriptive Statistics

Table 3 presents the descriptive statistics for each variable, including the mean, median, standard deviation (S.D.), minimum, and maximum values. Women on Boards (WOB) ranges from 0% to 100%. The minimum value indicates that some firms had no female directors, while the maximum value indicates that all directors in some firms were women. The mean WOB value is 0.1266, indicating that women represented, on average, approximately 12.7% of the directors in the sample firms.

The firms included in the study had initial public offering (IPO) dates ranging from 1979 to 2023. Therefore, the number of years for which the firms had been listed on the Indonesia Stock Exchange ranged from one to 43 years. As firm age is measured using the natural logarithm of the number of years since listing, its minimum value is 0. This value represents firms that had been listed for one year because the natural logarithm of 1 is 0. Some observations were excluded from the final sample based on the purposive sampling criteria.

Return on assets (ROA) ranges from −1.465 to 0.6135. A negative ROA indicates that a firm reported a net loss, meaning that its assets did not generate a positive return during the relevant year. RPT_RECEIVPAY ranges from −0.9789 to 0.5274. A negative value indicates that related-party payables exceeded related-party receivables relative to total assets; it does not indicate a decrease in these transactions. RPT_Sales and RPT_Purchase have minimum values of 0 because some firms did not conduct related-party sales or purchase transactions. Firms that did not disclose the required RPT information in their annual financial statements were excluded from the relevant analysis.

Table 3. Descriptive Statistics

Variables	N	Mean	Median	SD	Min.	Max.
WOBit	953	0.1266	0.000	0.1804	0.000	1.000
WOB_DUMMYit	953	0.4071	0.000	0.4916	0.000	1.000
FVit	953	1.563	1.062	1.479	0.1977	16.40
RPT_SALESit	953	0.1223	0.002651	0.2406	0.000	1.000
RPT_PURCHASEit	953	0.06824	0.000	0.2293	0.000	2.316
RPT_RECPAYit	953	-0.008863	0.000	0.1317	-0.9789	0.5274
SIZEit	953	28.35	28.18	1.686	23.76	33.66
AGEit	953	2.590	3.091	1.044	0.000	3.738
LEVit	953	0.2946	0.2325	0.4337	0.000	4.761
ROAit	953	0.01457	0.02466	0.1265	-1.465	0.6135
YEARit	953	2020	2020	1.415	2018	2022

Source: Processed Data

Correlation Analysis

The correlation matrix in Table 4 presents the correlations among the independent variables. The correlation coefficients range from 0.0011 to 0.8456. The correlation between WOB and WOB_Dummy is 0.8456, which exceeds the threshold of 0.8 because both proxies measure female representation on the board of directors. However, WOB and WOB_Dummy are included in separate regression models. The correlation coefficients among the remaining variables are below the threshold of 0.8 (Chao, 2018), indicating that multicollinearity is unlikely to be a serious concern in the regression models.

Table 4. Correlation Matrix

	Tobins Q	WOBit	WOB_ Dummy it	RPT_Sales	RPT_Purchase	RPT_Receiv Pay	SIZE	ROA	LEV	AGE	YEAR
TobinsQ	0										
WOB	0.1704	1									
WOB_ Dummy	0.0747	0.8456	1								
RPT_Sales	-0.0803	0.0293	0.0921	1							
RPT_ Purchase	-0.0879	0.0074	0.0070	0.2514	1						
RPT_ ReceivPay	-0.0200	-0.0340	-0.0294	0.1682	-0.1533	1					
SIZE	0.0011	-0.0983	0.0241	0.1531	0.0694	0.0978	1				
ROA	0.1705	0.0941	0.1131	0.0600	0.0648	0.1757	0.2364	1			
LEV	0.1157	-0.0795	-0.083	-0.0617	-0.0617	0.0705	0.0565	-0.2330	1		
AGE	-0.0311	-0.0152	-0.0099	0.0341	0.0341	-0.0613	0.2625	0.0676	0.00930	1	
YEAR	-0.0373	0.0252	0.0053	0.0032	0.0032	-0.0310	-0.0310	0.0100	-0.0196	-0.0368	1

Source: Processed Data

A heteroskedasticity test is carried out to find out whether the variance of the error term varies among observations. In the case where there is heteroskedasticity, WLS regression is used. The test are provided in Table 5.

Table 5. Multicollinierity and Heteroskesdasticity

	1A	1B	2A	2B	2C	2D	2E	2F
WOBit	1.028		1.227	1.118	1.037			
WOB_DUMMYit		1.108				1.303	1.130	1.029
RPT_SALESit			1.840			2.170		
RPT_PURCHASEit				1.351			1.390	
RPT_RECPAYit					1.481			1.608
WOBit * RPT_SALESit			2.025					
WOBit * RPT_PURCHASEit				1.432				
WOBit * RPT_RECPAYit					1.349			
WOB_DUMMYit * RPT_SALESit						2.489		
WOB_DUMMYit *RPT_PURCHASEit							1.501	
WOB_DUMMYit *RECPAYit								1.568
SIZEit	1.165	1.149	1.195	1.166	1.171	1.178	1.150	1.158
AGEit	1.076	1.076	1.083	1.095	1.096	1.078	1.097	1.092
LEVit	1.075	1.077	1.081	1.083	1.098	1.082	1.084	1.113
ROAit	1.157	1.154	1.157	1.158	1.205	1.157	1.155	1.202
YEARit	1.265	1.264	1.265	1.266	1.267	1.266	1.266	1.265
dt_2	1.343	1.344	1.346	1.344	1.344	1.346	1.346	1.345
dt_3	1.226	1.224	1.227	1.226	1.226	1.225	1.225	1.224
dt_4	1.284	1.281	1.285	1.285	1.286	1.281	1.281	1.281
Heterokedasticity	0	0	0	0	0	0	0	0
N	953	953	953	953	953	953	953	953

Source: Processed Data

Model Estimation Test

Model selection is one of the crucial stages in panel data regression analysis. Three tests are used to estimate the optimal model for panel data analysis. The first test that helps determine which model to choose, is the F-test to estimate either pooled or FEM.

Secondly, Hausman test determines either FEM or REM. Finally, Breusch-Pagan test helps decide on pooled or REM. The model selection results are shown in Table 6.

Table 6. Panel Diagnostic

	1A	1B	2A	2B	2C	2D	2E	2F
Estimasi Data Panel								
Fixed Effects estimator	4.40141E-140	4.48755E-144	3.00918E-137	5.68556E-138	3.06292E-140	5.95363E-142	2.46351E-142	3.59542E-144
Result	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
Random effect estimator								
Breusch-Pagan test	3.14579E-179	2.37487E-188	5.94389E-175	1.12895E-174	2.00117E-179	4.82629E-186	7.09033E-185	4.60856E-188
Result	Random	Random	Random	Random	Random	Random	Random	Random
Hausman Test	1.14158E-007	6.88331E-007	2.30384E-007	2.16442E-007	4.38225E-007	3.26293E-06	1.46801E-006	2.21454E-006
Result	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
Summary	WLS	WLS	WLS	WLS	WLS	WLS	WLS	WLS

Source: Processed Data

Table 7 provides the outcomes of the hypotheses test. Hypothesis 1 is tested from the results of regression analysis provided in Columns 1A and 1B. In Column 1A, the percentage of women directors has a positive and statistically significant impact on the value of the firms (coefficient = 1.12706; p-value = 2.88×10^{-33}). This implies that the outcome validates a significant positive relationship.

Table 7. Hypotheses testing

	1A	1B	2A	2B	2C	2D	2E	2F
Const	46.122**	41.358**	36.306*	42.126**	47.284**	33.141*	31.149*	23.197
WOBit	1.127***		1.365***	1.1659***	1.0580***			
WOB_DUMMYit		0.207***				0.311***	0.212***	0.185***
RPT_SALESit			0.076			-0.018		
RPT_PURCHASEit				-0.087			-0.187**	
RPT_RECPAYit					-0.531***			-0.833***
WOBit * RPT_SALESit			-2.679***					
WOBit * RPT_PURCHASEit				-1.962***				
WOBit * RPT_RECPAYit					-0.489			
WOB_DUMMYit * RPT_SALESit						-0.787***		
WOB_DUMMYit *RPT_Purchase							-0.472***	
WOB_DUMMYit *RPTReceiPay								-0.152
SIZEit	-0.052***	-0.065***	-0.043***	-0.047***	-0.048***	-0.064***	-0.071***	-0.528***
AGEit	-0.068***	-0.070***	-0.075***	-0.061***	-0.081***	-0.077***	-0.069***	-0.092***
LEVit	0.583***	0.528***	0.558***	0.568***	0.586***	0.551***	0.576***	0.578***
ROAit	2.094***	2.126***	2.045***	1.987***	2.263***	2.380***	2.327***	2.223***
YEARit	-0.022**	-0.019**	-0.017	-0.020*	-0.022**	-0.015	-0.014	-0.010
Adj. R-squared	0.311	0.283	0.327	0.291	0.309	0.334	0.283	0.326
Prob. (F-statistics)	2.59E-74	1.84E-66	9.93E-78	4.71E-67	1.80E-72	6.44E-80	6.51E-65	1.52E-77
N	953	953	953	953	953	953	953	953

Source: Processed Data

Column 1B gives an outcome similar to that of Column 1A. In Column 1B, a dummy variable shows whether the firm has a female director or not. There exists a positive and statistically significant effect of having a female director on firm value (coefficient = 0.207838; p-value = 1.57×10^{-18}). Thus, hypothesis 1 is validated.

The moderating effects of RPT are presented in Columns 2A–2F. Three RPT measures are used RPT_Sales, RPT_Purchase, and RPT_RecPay. Columns 2A and 2D present the moderating effect of RPT-sales on the relationships between WOB and firm value and between WOB_Dummy and firm value, respectively. The interaction coefficients for RPT_Sales are negative (−2.67919 and −0.786962), suggesting that RPT-sales weaken the positive relationship between female board representation and firm value.

The second measure uses RPT purchases. Columns 2B and 2E produce consistent negative interaction coefficients of −1.96217 and −0.471692, respectively. These results suggest that related-party purchases also weaken the positive relationship between female board representation and firm value. However, the third measure, RPT_RecPay, does not show a moderating effect in Columns 2C and 2F. As two of the three RPT measures indicate a weakening effect, the study concludes that the second hypothesis is supported.

Discussion

The Effect of Female Board Representation on Firm Value

The result from the hypothesis testing indicates that there is a positive impact of female board of directors on the performance of the firm using the Tobin's Q ratio. Both variables representing the percentage of female directors and dummy for at least one female board of directors have produced positive and statistically significant results. This implies that the investors perceive a positive image of having female board members in the corporation. It further implies that having more female directors increases the market performance of the firms.

This positive relationship may arise from the diverse perspectives, experiences, and decision-making approaches that female directors bring to the board. These qualities may complement those of other board members and improve the overall decision-making process (Widhiastuti et al., 2020). The findings of this study therefore demonstrate the importance of female directors in manufacturing firms. Firms in this sector face complex operational and strategic challenges that require effective governance and careful decision-making.

Previous studies suggest that women tend to be more risk-averse in their decision-making (Zalata et al., 2019). Female directors may also reduce agency costs by limiting agency conflicts within firms (Lee and Thong, 2022). Furthermore, their ability to manage multiple responsibilities and develop effective networks and negotiations may strengthen board effectiveness (Widhiastuti et al., 2020). These characteristics may contribute to better governance and increase investors' confidence in the firm.

The Moderating Effect of RPT on the Relationship Between Female Board Representation and Firm Value

Various factors may reduce firm value, including RPT. Firms that engage in higher levels of RPTs may experience lower firm value (Diab et al., 2019). The results of this study show that RPTs weaken the positive relationship between female board representation and firm value. This finding is consistent with previous evidence that RPTs may reduce firm value and performance (Abigail and Dharmastuti, 2022). RPTs may also reduce corporate resources and consequently harm the firm and its shareholders (Phung et al., 2023).

These results suggest that when a firm conducts a high level of transactions with related parties, the positive effect of female directors on market-based firm value becomes weaker. One possible explanation is that investors may view RPTs negatively because relationships between the parties involved can create opportunities for the transactions to be used for private benefits. Consequently, investors may consider the extent of RPTs when assessing a firm and making investment decisions. Even when female directors contribute positively to corporate governance, extensive RPTs may reduce investor confidence and weaken their positive effect on Tobin's Q.

Conclusions and Recommendations

The finding shows the level of representation of females on the boards of directors positively influences the value of firms. Both female representation and the ratio of females on boards have a significant positive influence on Tobin's Q. These results are in line with the previous studies which have indicated that female directors can decrease agency costs, increase transparency of the information environment of corporations, foster prudent risk-taking, and prevent corporate frauds.

However, RPTs weaken the positive relationship between female board representation and firm value. This means that the positive association between female directors and firm value becomes weaker as the level of RPTs increases. Investors may view RPTs as an important risk when assessing a firm because such transactions may be used by management to manipulate earnings or obtain private benefits. Opportunistic directors may also use RPTs to misappropriate corporate assets or misrepresent the firm's financial position.

Based on these findings, companies should recognise the potential contribution of women to board effectiveness and provide equal opportunities for qualified women to serve as directors. Board appointments should be based on competence, experience, and the value that candidates can contribute, while also supporting gender equality. Companies should also strengthen the monitoring, approval, and disclosure of RPTs to reduce potential conflicts of interest and protect minority shareholders.

This study is limited to manufacturing companies classified under SIC 02 and 03 and listed on the Indonesia Stock Exchange. Therefore, its findings may not be directly generalisable to companies in other sectors. Future research should include companies from a wider range of industries and compare whether the relationships among female board representation, RPTs, and firm value differ across sectors. For future study, the impact of women on boards (WOB) and related-party transactions (RPT) on business value may be nonlinear rather than strictly linear. Specifically, these interactions may follow a U-shaped pattern, with the effect on firm value changing as WOB representation or RPT reaches a given level. As a result, the linear models used in this work may not fully capture these potential threshold effects. Future research should investigate nonlinear specifications, such as squared WOB and RPT terms, to see if different levels of WOB and RPT have varied effects on firm value.

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