



Liquidity, firm size, and financial performance: the moderating role of female directors in Indonesian industrial firms

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ABSTRACT

This research examines how liquidity, firm size, and female directors affect the financial performance of industrial sector firms listed on the Indonesia Stock Exchange. Using the dependent variable of return on assets (ROA), the analysis considered liquidity (CR) and firm size (measured by total assets), alongside the moderating role of female representation on boards directors. The findings indicate that liquidity has a positive and significant impact on financial performance, supporting agency theory, signalling theory, and resource dependence theory. Meanwhile, firm size has a positive but insignificant effect on financial performance. However, women's presence on boards does not moderate the relationship between liquidity and performance, primarily due to their limited representation, which renders their role symbolic rather than impactful. In contrast, women's presence on boards amplifies the influence of firm size on performance, indicating that female directors improve decision-making quality, monitoring effectiveness, and resource access in larger firms. These findings emphasise the significance of financial health, operational scale, and inclusive governance as crucial drivers of corporate success in Indonesia's industrial sector.

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1. INTRODUCTION

Financial performance reflects how well an organization executes its activities, with strong results improving profitability and increasing stakeholder confidence (Diroh & Mochlasin, 2023). Financial data are communicated through systematically prepared and comprehensive financial statements that heavily influence investor perceptions and responses. These statements also act as benchmarks for regulatory adherence and tools for assessing growth potential and long-term financial stability. To meet operational and financial needs, maintaining sufficient liquidity is crucial for supporting daily operations and fulfilling obligations. Additionally, evaluating a company's financial performance involves more than just liquidity analysis; firm size is also an important factor. Generally, firm size indicates the scale of operations and business scope, commonly evaluated using the total assets it reports at the close of the financial period. Industrial companies tend to

be capital-intensive with large fixed assets and low liquidity, making cash and working capital management crucial (Urrahmah & Mukti, 2021). In addition, this sector is dominated by large-scale companies with high financial complexity and is sensitive to macro factors such as energy prices, exchange rates, and export demand. Therefore, liquidity and firm size are likely to exert a stronger influence on profitability in the industrial sector compared to other sectors.

Beyond financial considerations, corporate governance has become increasingly important in studies of economic performance because it influences how organizations are directed and their overall success (Al-Shaer et al., 2024). One key challenge is promoting gender balance, particularly by increasing the representation of women on boards. In Indonesia, organizational culture and corporate governance are still dominated by patriarchal values, resulting in relatively low representation of women in strategic positions. This makes their presence significant, as they bring different perspectives and leadership styles—more collaborative, empathetic, and ethics-oriented—which can enrich decision-making processes and enhance the effectiveness of oversight. Women in executive roles are believed to contribute diverse insights to strategic planning, fostering more balanced leadership styles and effective risk management (De Masi et al., 2022). In addition, from a regulatory standpoint, the Otoritas Jasa Keuangan (OJK) has encouraged the implementation of good corporate governance (GCG), emphasizing the principles of fairness, transparency, equality, and accountability (Rusyiana et al., 2025). Female directors have the potential to strengthen the application of these principles through participatory and sustainability-oriented leadership. Nevertheless, efforts to promote gender inclusivity face complex challenges, particularly in corporate settings where financial stability is crucial (Ionascu et al., 2018), stemming from patriarchal culture and gender stereotypes. This condition motivates researchers to examine the representation of women on boards, using it as a moderating variable to determine whether gender diversity amplifies or reduces the impact of liquidity and firm size on the financial performance of industrial companies listed on the Indonesia Stock Exchange.

Recognizing how gender diversity affects the connection between liquidity, firm size, and financial performance necessitates examining several key theories. The conflict between principals and agents is emphasized by agency theory, highlighting that a well-structured board is crucial for managing conflicts and reducing agency costs (Jensen & Meckling, 2014). Larger, highly liquid firms tend to be more complex, increasing the risk of information asymmetry and conflicts of interest. To address this, inclusive leadership plays a vital role. Women directors, known for their cooperative leadership style, promote transparency and bring diverse perspectives, fostering more inclusive decision-making. They tend to collaborate on decisions, which helps in making fairer choices when conflicts or competing interests occur (Bart & McQueen, 2013). Consequently, gender diversity can enhance the board's effectiveness in overseeing management.

Signalling theory suggests that companies send signals about their prospects or financial health to the market and stakeholders through managerial decisions or intrinsic traits. These signals, including liquidity and firm size, are often viewed as markers of a company's financial robustness and operational capacity. Moreover, having women on the board can reflect a commitment to gender equality and good governance, potentially enhancing reputation and market value (Gul et al., 2011). The primary aim of these signals is to influence how investors perceive the firm's worth, enabling them to make more informed investment decisions. In this research, signalling theory highlights how factors such as liquidity, firm size, and female board representation serve as indicators that shape investors' views of a company's financial performance within the industrial sector.

Another important theory in this study is resource dependence theory. This framework emphasises the board's strategic role in supplying key resources such as credibility, expertise, and external connections (Pfeffer & Salancik, 2003). Boards with

gender diversity tend to have higher credibility, improved stakeholder communication, and stronger links with various interest groups. Women on the board are especially valuable, as they can broaden external networks, enhance the company's legitimacy with stakeholders, and introduce diverse perspectives for strategic decisions (Moreno-Enguix et al., 2025). Drawing on the three theories previously discussed, it is reasonable to conclude that liquidity and firm size influence a company's financial performance. Moreover, female directors contribute to board effectiveness by promoting inclusive decision-making, reducing conflicts, and increasing legitimacy, stakeholder relationships, and access to external resources.

Various studies provide different insights. Many indicate that liquidity has little to no significant effect on a firm's financial performance (Huliselan, 2024; Kurniawati et al., 2024). Some research shows mixed or inconclusive results (Mehmetaj & Hajdari, 2025). Certain studies suggest that firm size has no impact on financial results (Priskila & Dewi, 2023; Rahima & Muid, 2023). Larger firms may encounter operational challenges due to their size, which can potentially reduce profitability (ISLAM et al., 2023). Some research also suggests that a firm's board gender composition may have a negative impact on financial performance (Adams & Ferreira, 2009; Kabir et al., 2023; Mínguez-Vera & Martin, 2011). One study highlights potential disadvantages of female board members, including investor stereotypes and biases from predominantly male investors (Dobbin & Jung, 2011). Increasing female representation has sometimes been associated with lower corporate performance and profitability, suggesting that the effect of gender diversity on financial outcomes is not universally positive and may even diminish firm value (Haslam et al., 2010). Research on women on boards and their influence on these relationships has shown mixed results. Therefore, further research is necessary to determine whether women on boards truly increase the effect of firm size on financial performance, especially in industrial firms listed on the Indonesia Stock Exchange.

Financial results are essential for stakeholders both within and outside a business. To succeed, attract interest, and grow, a company must generate profitable returns. Financial performance, usually measured by profit, represents a significant benchmark of business performance from a financial standpoint (Juniartin & Aji, 2025). This metric helps evaluate performance, identify future opportunities, and confirm sustainability. It underscores the importance of financial health for a company's survival, as business operations rely heavily on financial resources. In this study, the author examines financial performance using the profitability ratio of return on assets (ROA). ROA, a common key indicator, reflects the effectiveness of a company's asset utilization in creating profit (R. Singh et al., 2023). The calculation involves dividing the firm's profit by its total assets (Sagala et al., 2024), reflecting how efficiently a company manages its resources to meet its financial objectives (Zoraya et al., 2022).

Liquidity reflects a firm's capacity to fulfil its short-term liabilities while ensuring continuity of operations. Commonly used indicators like the current ratio and quick ratio assist analysts in evaluating short-term solvency (Nam & Tuyen, 2024). In this study, the current ratio is used to assess whether a company has sufficient assets to settle its debts, measured by comparing current assets with short-term obligations. A higher current ratio indicates a greater ability to meet short-term liabilities. However, excessive liquidity may lead to surplus working capital, potentially resulting in economic losses and reduced income. On the other hand, low liquidity heightens the risk of bankruptcy and insolvency (Poliakov & Zayukov, 2023). Research on the effect of liquidity on financial performance yields mixed results. Some studies show a positive impact (Nguyen et al., 2024; Samo & Murad, 2019), while others find no significant influence (Li et al., 2020). Overall, the author suggests that liquidity typically has a positive impact on financial performance, as it reflects the extent to which a firm can meet its short-term commitments rapidly. Good liquidity indicates that the company has sufficient current

resources to meet its short-term obligations, reduces insolvency risk, and fosters market confidence in its financial health.

H1: Liquidity positively impacts the financial performance of companies in the industrial sector listed on the Indonesia Stock Exchange.

Evaluating a company's financial performance involves more than just analysing financial statements; it also considers firm size, which is often regarded as a fundamental characteristic (Dang et al., 2018). Firm size generally indicates the scale of operations and the extent of business activities, usually measured by total assets at the end of the accounting period. Larger firms tend to operate more broadly, resulting in increased production and higher sales. These higher sales typically result in increased revenue and profits, which in turn boost net income and ultimately raise the return on assets (Hashmi et al., 2020). However, research indicates that the performance differences between large and small firms are primarily due to firm-specific effects — unique attributes of each company — rather than size itself (Fernández et al., 2019). Idiosyncratic refers to the distinct resources and capabilities that set a company apart, such as corporate image, customer loyalty, trust, product knowledge, understanding customer needs, and service efficiency (Houthoofd et al., 2010). Empirical studies have yielded mixed results regarding the impact of firm size on financial performance. Some suggest that larger firms perform better financially (Nuryanti & Suryandani, 2025), making size a strategic factor for managers seeking higher profitability (Bolarinwa & Obembe, 2019). Others, however, find no significant impact of firm size on performance (Saputri & Setiawati, 2024). Overall, evidence suggests that larger firms tend to have more effective resource management capabilities, particularly in finance, supervision, and information systems, which have a positive impact on financial outcomes.

H2: The size of a company has a positive effect on the financial performance of industrial sector companies listed on the Indonesia Stock Exchange.

Women's participation on boards can influence company performance by acting as a moderating factor that amplifies the link between internal aspects, such as liquidity and firm size. Assessing a firm's capacity to cover immediate financial commitments and ensure continuity of its activities largely depends on its liquidity. In this context, female board members significantly strengthen the connection between liquidity and financial success. Women in leadership roles enhance board diversity, provide more comprehensive oversight, and prioritise long-term resource planning. A study of 111 Greek companies from 2008 to 2022 indicated that gender diversity can enhance firm performance when women attend 33% of board meetings (Arvanitis et al., 2022). However, some research finds no significant relationship between women directors and ROA (Simionescu et al., 2021). Therefore, the researcher suggests that female board members can reinforce the link between liquidity and financial results, as women tend to lead cautiously, pay attention to detail, and adopt a long-term perspective. This leadership style promotes prudent liquidity management, resulting in enhanced stability and profitability.

H3: Including women on the board can improve the effect of liquidity on the financial performance of industrial sector companies listed on the Indonesia Stock Exchange.

Regarding firm size, female directors notably enhance the profitability of smaller firms through their effective oversight, as noted by Sattar, Biswas, & Roberts (2023). Contrarily, empirical research indicates no significant link between board gender composition and financial performance (J. Singh et al., 2023). In this context, the author suggests that female board members could amplify the effect of firm size on financial outcomes, owing to their tendency to bring diverse perspectives, participative leadership, and better communication and oversight skills.

H4: The presence of women on the board of directors can enhance the impact of firm size on the financial performance of companies in the industrial sector listed on the Indonesia Stock Exchange.

2. RESEARCH METHOD

The author's research in the industrial sector is a quantitative analysis based on numerical data. It utilizes secondary data based on the official Indonesia Stock Exchange website, www.idx.co.id. Purposive sampling is employed to select companies in the industrial sector that meet particular criteria aligned with the study's objectives. These criteria include companies listed on the Indonesia Stock Exchange before 2020 that have submitted annual financial reports from 2020 to 2024. The sample selection process is summarised in the table below.

Table 1. Sample Selection Process

No.	Criteria	Not Eligible	Eligible
1.	Population Companies listed in the industrial sector on the IDX		65
2.	Companies listed on the IDX before 2020	(20)	45
3.	The company has published annual financial reports throughout the research period	(6)	39
4.	Sample size = 5 years*39		195

This study examines a single dependent variable, Y, which measures return on assets (ROA) as a metric of financial performance. The independent variables include liquidity (X1), evaluated using the current ratio (CR), and firm size (X2), which is determined based on the natural logarithm of year-end total assets. The moderating variable (Z) is the presence of female directors on company boards within the industrial sector listed on the Indonesia Stock Exchange. The measurement table for these variables is provided below.

Table 2. Variable Measurement

No.	Variabel	Measurement
1.	Financial Performance	$ROA = \frac{\text{Net Income}}{\text{Total Assets}}$ Source: Juniartin & Aji, 2025.
2.	Liquidity	$CR = \frac{\text{Current Assets}}{\text{Current Liabilities}}$ Source: Wulandari et al., 2020.
3.	Firm Size	Log Natural (Total Assets) Source: Nuryanti & Suryandani, 2025.
4.	Female Director Presence	Dummy: 1 = ≥1 female board director 0 = no female director Source: Chang et al., 2024.

3. RESULTS AND DISCUSSIONS

Following the established sampling criteria, 39 companies were chosen for the study. The data covers five years, from 2020 to 2024, comprising 195 data points gathered from each company's annual financial reports. Out of these, 195 data points were discarded as outliers—values that deviated markedly from the norm, which could distort results, affect statistical tests, and lead to biased conclusions. Consequently, the final dataset for this research consists of 174 samples.

Table 3. Descriptive Test Result

	ROA (Y)	CR (X1)	Firm Size (X2)	Female Director Presence (Z)
Mean	0.033023	2.353333	0.101572	0.425287
Median	0.031500	1.625000	0.097843	0.000000

Maximum	0.160000	11.76200	1.661281	1.000000
Minimum	-0.123000	0.084000	-2.923900	0.000000
Std. Dev.	0.057555	2.240254	0.275986	0.495813
Observations	174	174	174	174

Based on 174 observations, the dependent variable (ROA) ranges from -0.123 to 0.160, with a mean of 0.033 and a standard deviation of 0.058. The first independent variable, liquidity (current ratio), ranges from 0.084 to 11.762, averaging 1.625 with a standard deviation of 2.240. The second independent variable, firm size (log value), varies between -2.924 and 1.661, with a mean of 0.098 and a standard deviation of 0.276. The moderating variable, female board presence, ranges from 0 to 1, with an average of 0 and a standard deviation of 0.496.

Table 4. Result of Panel Data Regression Model Selection

Test Model Type	Result	Conclusion
Chow Test (CEM vs FEM)	0.0000	FEM
Hausman Test (FEM vs REM)	0.7329	REM
LM Test (CEM vs REM)	0.0000s	REM

Model selection using the Chow, Hausman, and Lagrange Multiplier (LM) tests identified the random effect model as the most appropriate. The multicollinearity test showed no strong correlation among variables, with all VIF values below 10. Additionally, the Glejser test confirmed the absence of heteroscedasticity, as all significance values exceeded 0.05.

Table 5. Result of Multiple Regression F Test

	Before Moderation	After Moderation
R-Squared	0.216492	0.276727
Adjusted R-squared	0.202666	0.259608
Prob (F-statistic)	0.000000	0.000000

The regression results show an R^2 value of 0.276727, indicating that about 27.67% of the variation in financial performance is explained by liquidity and firm size within the model. Before including the moderating variable, the R^2 was 21.64%, increasing to 27.67% after moderation, which suggests that the moderating variable improves the model's explanatory power. However, around 72.33% of the variation is not captured, implying that other internal and external factors may influence financial performance. The F-test value of 0.000, lower than the 0.05 threshold, confirms that the model is statistically valid. External factors that may contribute to these results include OJK policies, investor perceptions, and corporate culture in Indonesia. OJK regulations regarding female representation on boards are still advisory rather than mandatory, limiting the strategic influence of female directors. Moreover, gender-biased investor perceptions and corporate cultures often treat female board membership as symbolic compliance with diversity standards rather than recognition of competence or influence on firm outcomes. Consequently, the moderating role of female directors appears weak in affecting financial performance.

Table 6. Result of T Test Before Moderation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.063280	0.066878	-0.946196	0.3454
X1	0.009527	0.001748	5.451614	0.0000

X2	0.002199	0.002397	0.917515	0.3602
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Based on the table, the regression equation is: $Y = -0.063280 + 0.009527 X_1 + 0.002199 X_2$. Liquidity (CR) has a significant and positive impact on the company's financial performance, as measured by Return on Assets (ROA). Although firm size shows a positive relationship, its p-value exceeds 0.05, indicating its impact on financial performance is not statistically significant.

Table 7. Result of T Test After Moderation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.023233	0.065693	-0.353655	0.7240
X1	0.014930	0.002226	6.706376	0.0000
X2	0.000307	0.002376	0.129134	0.8974
X1*Z	-0.012545	0.003391	-3.699665	0.0003
X2*Z	0.002122	0.000402	5.272523	0.0000

The regression equation is derived from the t-test results shown in Table 7: $Y = -0.023233 + 0.014930 X_1 + 0.000307 X_2 - 0.012545 X_1*Z + 0.002122 X_2*Z$. The results indicate that liquidity (CR) is positively significant and has an impact on the company's financial performance (ROA), confirming hypothesis H1. This suggests that higher liquidity is associated with improved financial results, as firms with strong liquidity can more effectively meet short-term obligations. These results align with agency theory, which illustrates the connection between managers (agents) and owners (principals). Managers are expected to act in the owners' best interest, including maintaining liquidity. High liquidity indicates that managers have efficiently managed cash flows and current assets.

The second hypothesis indicates that firm size has a positive but insignificant relationship with financial performance. This condition suggests that a larger firm size is not always followed by a proportional increase in profitability. This may occur because large firms often face operational inefficiencies, complex organizational structures, and high overhead costs, which reduce the benefits of economies of scale. In Indonesia's industrial sector, large firms indeed possess greater resources and production capacity, but operational complexity and high cost structures often hinder the optimization of financial performance. Nevertheless, the positive relationship still indicates that larger firms have greater potential to achieve better performance, as they generally have wider access to funding, technology, and stronger management systems that help maintain stability and support the attainment of long-term financial objectives.

The third hypothesis, which proposed that female board representation would strengthen the relationship between liquidity and financial performance, is not supported. The findings contradict earlier theories suggesting that having women on boards can improve a company's financial performance. Owing to the low proportion of women holding these roles, their potential traits are not sufficiently leveraged to impact firm performance, especially since men significantly outnumber women in Indonesian industrial companies. As a result, gender diversity on the board remains symbolic, and women's contributions have yet to lead to measurable improvements in company performance (Wijaya & Memarista, 2024). In contrast, the fourth hypothesis, which suggested that women on the board could enhance the effect of firm size on financial performance, is validated. This implies that women on the board enhance decision-making, monitoring, and resource allocation, thereby mitigating the influence of firm size on financial outcomes. Their involvement also brings diverse perspectives into strategic planning, ultimately increasing the company's competitiveness.

4. CONCLUSION

The findings of this study confirm that liquidity and firm size are significant factors influencing the financial performance of industrial sector companies listed on the Indonesia Stock Exchange. Firms with higher liquidity are better able to meet short-term obligations and maintain operational stability, while larger firms tend to perform better due to their broader access to resources, advanced technology, and greater growth opportunities. This condition indicates that financial health and operational scale are key determinants of corporate success. Adequate liquidity enables firms to respond swiftly to external shocks and market fluctuations, whereas larger size provides long-term resilience and supports sustainable growth. The study also highlights the role of gender diversity on boards of directors. Although the presence of women did not moderate the relationship between liquidity and performance—likely due to their limited representation—it did strengthen the relationship between firm size and financial performance. This suggests that women can enhance governance effectiveness when supported by sufficient structural influence, particularly in larger firms, by providing perspectives that complement those of male colleagues and contributing to more balanced decision-making.

Based on these findings, this study is expected to provide practical contributions for industrial company management in formulating optimal strategies for liquidity management and leveraging firm size to improve financial performance. Managers can maintain a healthy balance of cash and working capital while optimizing scale advantages such as operational efficiency, stronger bargaining power, and market expansion. In addition, this study offers recommendations for regulators to strengthen regulatory frameworks by establishing minimum targets or quotas for female representation on boards of directors, so that gender diversity can be institutionalized as a measurable governance standard. This initiative can be complemented with training, mentoring, and leadership development programs to prepare and empower more women to occupy strategic positions. In this way, companies are expected to enhance profitability, strengthen governance, and build greater resilience in facing economic dynamics and macroeconomic pressures.

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