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# **Free Cash Flow as a Moderator Between Board Characteristics and Dividend Policy: Evidence from Jordan's Industrial Sector**

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## **Abstract**

**Purpose:** This study investigates the relationship between board characteristics and dividend policy in the context of emerging markets, where agency problems and governance effectiveness remain critical concerns. Although prior research has investigated the direct effects of board attributes on dividend policy, the moderating influence of firms' internal financial resources, notably free cash flow, remains underexplored.

**Design/Methodology/Approach:** Using panel data from industrial firms listed on the Amman Stock Exchange over the period 2016–2020, this study employs panel regression techniques to examine the effects of board independence, board size, and board meeting frequency on dividend payouts, while explicitly modeling free cash flow as a moderating variable.

**Findings:** The empirical findings indicate that board independence and board size are positively and significantly associated with dividend payouts, whereas board meeting frequency does not exhibit a significant direct effect. Furthermore, interaction analysis indicates that higher free cash flow significantly amplifies the effect of board independence and size on dividend policy, implying that governance mechanisms are more effective in guiding dividend decisions under greater internal liquidity.

By incorporating free cash flow as a moderating factor, this study offers new insights into the mixed evidence reported in the corporate governance and dividend policy literature. These findings enhance understanding of the interplay between internal governance mechanisms and financial conditions in mitigating agency conflicts, especially within emerging market contexts.

**Practical Implications:** The findings offer practical implications for policymakers, investors, and corporate directors. The study recommends enhanced transparency in free cash flow reporting and improved governance guidelines to strengthen dividend decision-making in developing economies.

**Originality/Value:** This research introduces an interaction-based framework that evaluates how board characteristics and free cash flow jointly influence dividend decisions. This originality provides a new explanation for why previous studies have reported inconsistent findings regarding the impact of board structure on dividend policy. This study is directly related to Decision Sciences because it examines how corporate boards and managers make strategic financial decisions under varying levels of free cash flow, highlighting the governance mechanisms that shape dividend decision-making in emerging markets.

**Keywords:** Corporate Governance, Dividend Policy, Board Characteristics, Free Cash Flow, Jordan

**JEL Classifications:** G34, G35, C23.

## 1. Introduction

Dividend policy remains one of the most debated topics in corporate finance, yet its determinants in emerging markets continue to be insufficiently understood (Nguyen, 2022). Research remains limited regarding how internal governance mechanisms interact with a firm's financial flexibility to influence dividend payout decisions. This issue is especially relevant in Jordan's industrial sector, where firms operate in an environment characterized by information asymmetry, concentrated ownership structures, and evolving corporate governance regulations (Mardessi, 2021). These contextual features provide strong motivation for investigating how board characteristics influence dividend policy when firms possess different levels of free cash flow (Abbad et al., 2016).

The board of directors is a central mechanism in corporate governance, responsible for key strategic decisions, including dividend distribution. Attributes such as board independence, size, meeting frequency, and financial expertise influence the board's ability to monitor management and protect shareholder interests (Chen et al., 2017). Agency theory posits that dividends serve to mitigate agency conflicts by restricting free cash flow available to managers, thus constraining managerial discretion, and aligning managerial actions with shareholder interests (Jensen & Meckling, 1976). This theory not only underscores the importance of free cash flow but also justifies investigating board characteristics as essential governance tools that can mitigate agency problems and influence dividend policy.

While agency theory provides the primary lens for this study, alternative perspectives such as signaling theory and resource dependence theory offer complementary insights. Signaling theory views dividend payments as conveying firm quality to the market, while resource dependence theory emphasizes the board's role in securing external resources and reducing uncertainty. These frameworks enrich the broader understanding of how governance mechanisms may influence dividend policy, though the current study focuses on agency-related explanations.

In recent years, the role of corporate governance mechanisms, particularly board characteristics, in shaping dividend policy decisions has gained increasing attention. The board of directors is expected to monitor managerial behavior and protect shareholder interests. Hence, the structure and functioning of the board – such as board independence, board size, and meeting frequency – are hypothesized to influence how and when firms distribute earnings.

Although previous studies have examined these relationships extensively in developed economies, limited research exists on emerging markets, particularly in the Middle East. Jordan provides a relevant empirical context due to its evolving regulatory environment, and the pivotal role industrial firms play in its economic development. While prior research has linked dividend policy to various corporate governance mechanisms, the role of the board of directors as a critical internal governance tool remains underexplored in developing economies. Attributes such as board independence, size, and meeting frequency are posited to influence the board's decision-making quality, particularly concerning dividend payouts (Chen et al., 2017). Moreover, agency theory underscores the importance of dividends in reducing free cash flow and

aligning managerial actions with shareholder interests. Yet, the relationship between governance characteristics and dividend policy, moderated by cash flow availability, remains insufficiently understood, particularly in the Jordanian context.

The core research problem addressed is the scarcity of empirical evidence on whether the efficacy of board mechanisms is contingent upon the firm's liquidity position. Although prior studies have examined board independence, board size, and meeting frequency as predictors of dividend policy, most of them treat these governance variables and free cash flow as independent factors. As a result, existing literature fails to explain why the relationship between board structure and dividend payout often produces inconsistent or contradictory results across different markets. This research seeks to fill that gap.

This study is original in proposing an interaction-based framework that concurrently assesses the effects of board characteristics and free cash flow. Unlike previous research, which primarily examines direct governance effects, this paper explores whether free cash flow strengthens or weakens the influence of board independence, board size, and board activity on dividend decisions. By focusing on the moderating role of free cash flow, the study offers a new theoretical explanation for variations in governance effectiveness, particularly in emerging economies where agency problems are more pronounced.

Additionally, the study contributes novel empirical evidence from Jordan's industrial sector, a context largely overlooked in prior literature despite its economic significance. By using panel data from firms listed on the Amman Stock Exchange between 2016 and 2020, the research provides insights relevant not only to academics but also to policymakers, regulators, and corporate directors seeking to enhance governance practices and improve dividend decision-making in developing markets. Motivated by these gaps, this study examines whether free cash flow moderates the relationship between board characteristics and dividend policy in Jordanian industrial firms. In doing so, it explicitly incorporates rigorous panel unit root testing and model specification to avoid spurious regression. Study contributes to the literature in three ways. First, it provides theory-driven evidence on the conditional role of free cash flow in governance–dividend relationships. Second, it offers new empirical evidence from Jordan's industrial sector, an underexplored context. Third, it demonstrates the importance of econometric consistency when analyzing governance and financial policy using panel data.

The structure of this paper is as follows: the subsequent section reviews the background theory, relevant literature, and hypothesis development. The methodology section outlines the research design, data collection, and analysis methods. Finally, the results, discussions, and conclusions are presented, offering actionable insights and policy recommendations.

## **2. Background Theory**

The relationship between board characteristics and dividend policy can be explained through several well-established theoretical perspectives, including Agency Theory, Signaling Theory, and the Free Cash Flow Hypothesis.

As the combination of contracts formalized by Jensen and Meckling (1976), the Agency Theory views the firm as a nexus of contracts whereby the managers (agents) do not necessarily act in the best interest of the shareholders (principals). One overriding implication of the theory is that agency costs will be incurred when managers are in possession of firm resources, yet they have not internalized the effects of their decision. Free cash flow is one of the major providers of agency costs, which is defined by Jensen and Meckling (1976) as cash beyond the amount needed to finance all projects with a positive net present value. Mathematically, in a situation where the free cash flows are positive and unlimited, the managers will maximize their own utility as opposed to firm value, thus resulting in overinvestment, consumption of perquisites, or inefficient retention of earnings.

Dividend policy comes into the agency problem as a form of governance that cuts down on the agency costs through restricting the amount of discretionary cash that can be used to pay off managers. Dividend payment decreases the funds available internally and compels firms to find alternative financing sources that expose managers to the scrutiny of the capital market. Thus, Agency Theory predicts a positive relationship between board independence and dividend payouts, especially when free cash flow rises (Abbott et al., 2004; Idris et al., 2018; Onyabe, 2022; Purcell et al., 2014). As a result, companies that have better surveillance systems are expected to pay more dividends, especially when the free cash flow is growing.

The size of a board affects agency results because it affects monitoring and decision aggregation capacity. The larger board sizes, perhaps, enhance oversight due to the concentration of multiple expertise and the likelihood that managerial decision-making will not be questioned. Theoretically, the larger the board size, the higher the likelihood that managerial opportunism will be detected, which reinforces the dividend-agency cost channel. Nevertheless, the Agency Theory does not ignore the cost of coordination, which means that the net impact of the board size is an empirical issue (Jensen & Meckling, 1976). The hypothesis of this research is therefore that the effect of board size on dividend policy is positive, and whether this effect is enhanced by variations in free cash flow.

The frequency of board meetings indicates how the board is monitoring. The higher the frequency of meetings, the greater the information flows and the less time it takes to take correct action, which may be a reduction in agency costs. Ideally, an increase in monitoring intensity is supposed to increase the imposition of dividend payment when the managers want to hold increasing free cash flow. Nevertheless, when meetings are regular or reactionary, they may have a limited marginal monitoring value, causing an unclear expected effect.

The Free Cash Flow Hypothesis is an extension of Agency Theory, making a direct relationship between the effectiveness of governance and the amount and size of internal cash resources. As the free cash flow goes up, the agency problems increase, and this increases the marginal value of good governance. Hence, the hypothesis implies that there should be a direct impact of a free cash flow on dividends and an interactive impact such that the importance of the governance mechanisms increases with the increase in a free cash flow (Al-Shaer & Zaman, 2021; Alzeban, 2019; Baatwah et al., 2019; Soliman & Ragab, 2014;

Supriyanto et al., 2017). This gives the theoretical rationale of modeling free cash flow to be more of a moderating variable and not control per se.

Signaling Theory provides a complement to this point of view by regarding dividends as signals of quality of firms and future cash-generating capacity. Boards are also important in making sure that dividend signals are believable and are in line with underlying fundamentals. Nevertheless, agency issues are dominant even in a signaling system since weak forms of governance can enable managers to give misleading signals (Liao & Hsu, 2013; Sitienei, 2022). Thus, the relationships discussed in the current paper can be explained primarily by the Agency Theory.

In combination, these theoretical arguments forecast that board independence and board size must positively impact dividend payouts, the impact of board meeting frequency is ambiguous, and that the transformations in free cash flow will enhance the governance-dividend relationship. The hypotheses that are formulated in the following section are based on these predictions.

### ***2.1 Significance of the Governing Board***

The significance of the board extends beyond its monitoring role to include strategic oversight. While executive management is tasked with formulating and implementing organizational goals and managing day-to-day operations, the board is responsible for reviewing and approving these strategic directions. It plays a crucial role in overseeing financial decisions such as earnings distribution, the use of surplus cash flows, and dividend policies. The board also ensures that financial reporting and internal control systems are robust and effective, promoting sound risk management and accountability. Furthermore, it selects, compensates, and evaluates top executives to ensure that leadership decisions are aligned with the organization's long-term objectives. Through these functions, the board contributes to the overall integrity and efficiency of the governance framework, reinforcing its role as an agent of shareholder protection and corporate accountability (Abbott et al., 2004; Idris et al., 2018).

### ***2.2 Characteristics of the Board of Directors***

The composition and characteristics of the board significantly influence its governance effectiveness. Publicly traded companies typically have stricter regulatory requirements for board roles compared to private firms. These responsibilities include selecting and supporting the CEO, ensuring adequate financial resources, adopting budgets, and determining dividend payouts. The number of directors, board independence, and the frequency of meetings are among the key characteristics affecting dividend policies and governance outcomes (Abouini & Al-Omari, 2016; Ajward, 2011; Alawaqleh & Almasria, 2021).

#### **2.2.1 Board Size**

Board size is a critical factor influencing corporate decisions, including dividend distribution. Larger boards often bring diverse perspectives and enhanced oversight of management actions, which can lead to improved decision-making. However, overly large boards may encounter communication challenges

and reduced efficiency, potentially leading to poor governance (Al-Shaer & Zaman, 2021; Alzeban, 2019; Baatwah et al., 2019). Research offers mixed findings: some studies indicate that larger boards are associated with higher dividend payouts (Badolato et al., 2014; Bédard & Gendron, 2010), while others report no significant relationship (Belhouchet & Chouaibi, 2024).

### **2.2.2 Board Independence**

Good governance is based on independence within the board. Independent directors offer unbiased decisions, which improve accountability, and care first and foremost for shareholder value. Board research indicates that boards with a greater proportion of independent directors will allocate dividends more effectively because they tend to focus on shareholder interests versus personal or management agendas (Boshnak, 2023). However, findings are mixed: As with many studies, they find that board independence is positively correlated with dividend payouts (Carrera et al., 2017; Chandar et al., 2012), while Ghafran and O'Sullivan (2017) suggest independence's impact is limited.

### **2.2.3 Frequency of Board Meetings**

The number of board meetings is another critical factor in determining the quality of governance by a board and its level of decision-making. Regular meetings enhance supervision, reduce fraud, and improve audit oversight (Chen et al., 2017). Hamza (2020) recommended that boards convene at least six times annually to maintain governance effectiveness. Although some studies suggest a positive correlation between meeting frequency and dividend distributions (Idris et al., 2018; Jabak, 2022), others, such as Ajward (2011), found no significant relationship.

### **2.2.4 Dividend Policies**

Dividend policy is a strategic decision balancing shareholder payout and retained earnings for reinvestment. It reflects a firm's financial health and future growth prospects, playing a critical role in corporate governance. Effective dividend policies align with comprehensive governance principles, satisfying both current shareholder demands and future investment needs (Bédard & Gendron, 2010).

Dividend strategies vary by organization. Companies may issue cash dividends or stock dividends based on their characteristics and financial performance. Frequency of distributions also varies, with some firms making quarterly, semi-annual, or annual payouts. The ideal dividend policy balances present distributions with long-term growth, enhancing shareholder value in the market (Chandar et al., 2012).

## ***2.3 Change in Free Cash Flow as a Moderating Variable***

Given the mixed evidence in the existing literature, this study argues that free cash flow plays a critical moderating role in the relationship between board characteristics and dividend policy. Boards may possess the formal authority to influence payout decisions, but their ability to do so effectively depends on the availability of cash resources. When free cash flow is substantial, boards exhibiting stronger governance

traits—such as increased size, greater independence, and higher engagement—are better positioned to enforce dividend distributions and mitigate agency conflicts.

In contrast, when free cash flow is limited, even well-structured boards may have little discretion in determining payout policies. Therefore, ignoring the moderating role of free cash flow may explain why prior studies report inconsistent findings regarding the impact of board characteristics on dividends (Lee & Phua, 2022).

By explicitly incorporating free cash flow as a moderating variable, this study provides a more nuanced theoretical explanation of how governance mechanisms interact with financial resources to shape dividend policy. This approach extends the corporate governance and dividend policy literature and contributes to the decision sciences field by highlighting the joint influence of organizational structure and financial constraints on strategic payout decisions (Al-Shaer & Zaman, 2021; Alzeban, 2019; Baatwah et al., 2019)

## ***2.4 Previous Research***

Numerous viewpoints with conclusions are presented in the entire body of investigations on the association between governance of companies and dividend distribution of wealth, demonstrating the complicated relationships existing among organizational structures as well as policy regarding dividends in diverse circumstances.

Johl et al. (2007) found that strong corporate governance positively influences dividend payments, highlighting the importance of board independence. Similarly, Idris et al. (2018) showed that cash dividends significantly reduce agency costs, while certain management incentives may increase them. These findings support the current study's focus on how governance practices and dividend policies can influence financial efficiency and shareholder alignment.

Several prior studies have explored the relationship between corporate governance and dividend policy. Kothari et al. (2005) found that while board independence negatively influenced dividend distribution in Saudi firms, a higher number of directors had a positive effect, suggesting that board structure can shape payout decisions (Lee & Phua, 2022).

Previous studies have highlighted mixed outcomes regarding the impact of corporate governance and firm characteristics on dividend policies. Several researchers (e.g., Al-Shaer & Zaman, 2021; Alzeban, 2019; Baatwah et al., 2019) emphasized the role of financial indicators and institutional ownership in shaping dividend distributions, while others (Liao & Hsu, 2013) linked board independence and meeting frequency to increased dividend payouts. Lutfi et al. (2022) further explored board composition, gender diversity, and CEO-chair duality, showing varied effects on dividend policy, often moderated by firm-specific factors like free cash flow. While some studies (e.g., Maina et al. (2017) reported negative relationships between board independence and dividend payments, the findings remain context dependent. These insights support the current study's aim to further explore how governance mechanisms interact with dividend strategies, particularly in diverse regional and institutional contexts.

## ***2.5 Hypothesis Development***

Based on agency theory, signaling theory, and the free cash flow hypothesis, this study formulates the following hypotheses:

- H1: The independence of the board of directors does not have a significant effect on dividend payments in Jordanian industrial companies listed on the ASE.
- H2: The size of the board of directors does not have a significant effect on dividend payments in Jordanian industrial companies listed on the ASE.
- H3: The number of board of directors' meetings does not have a significant influence on dividend payments in Jordanian industrial companies listed on the ASE.
- H4: Change in Free cash flow does not moderate the relationship between board independence and dividend payments in Jordanian industrial companies listed on the ASE.
- H5: Change in Free cash flow does not moderate the relationship between board size and dividend payments in Jordanian industrial companies listed on the ASE.
- H6: Change in Free cash flow does not moderate the relationship between the number of board of directors' meetings and dividend payments in Jordanian industrial companies listed on the ASE.

## **3. Methodology**

This study adopts a quantitative research design using panel data regression techniques to examine the relationship between board characteristics, free cash flow, and dividend policy in Jordanian industrial firms. Panel data analysis is appropriate because it captures both cross-sectional and time-series variation, improving estimation efficiency and reducing omitted variable bias.

Annual panel data were collected for 43 industrial firms listed on the Amman Stock Exchange over the period 2016–2020, yielding 215 firm-year observations. The dependent variable is dividend policy, measured by dividends per share (DPS). The key explanatory variables include board independence (BIND), board size (BSIZE), and board meeting frequency (BMEET), representing monitoring effectiveness, board structure, and board activity, respectively. The change in free cash flow ( $\Delta FCF$ ) captures internal liquidity and potential agency conflicts arising from excess cash holdings. First difference of firm size ( $\Delta \text{LnSIZE}$ ), defined as the first difference of the natural logarithm of total assets.

Firm size is initially measured as the natural logarithm of total assets (LnSIZE). Since the series is non-stationary at levels, the first difference of the logged firm size ( $\Delta \text{LnSIZE}$ ) is used in all regression estimations.

The empirical model is specified as follows:

$$\begin{aligned} \text{DPS}_{it} = & \alpha + \beta_1 \text{BIND}_{it} + \beta_2 \text{BSIZE}_{it} + \beta_3 \text{BMEET}_{it} + \beta_4 \Delta \text{FCF}_{it} + \beta_5 \text{BIND}_{it} * \Delta \text{FCF}_{it} + \beta_6 \text{BSIZE}_{it} * \Delta \text{FCF}_{it} \\ & + \beta_7 \text{BMEET}_{it} * \Delta \text{FCF}_{it} + \beta_8 \Delta \text{LnSIZE}_{it} + \varepsilon_{it}, \end{aligned} \quad (1)$$

where

- DPS<sub>it</sub> : Dividends per share for firm *i* in year *t*,
- BIND<sub>it</sub> : Board independence (proportion of non-executive directors),
- BSIZE<sub>it</sub> : Board size (total number of board members),
- BMEET<sub>it</sub> : Number of board meetings held annually,
- ΔFCF<sub>it</sub> : First difference of free cash flow,
- ΔLnSIZE<sub>it</sub> : First difference of the natural logarithm of firm size,
- α : intercept,
- β<sub>1</sub> to β<sub>8</sub>: Estimated coefficients and,
- ε<sub>it</sub> : error term.

Interaction terms between board characteristics and ΔFCF are included to capture whether changes in internal liquidity condition the effectiveness of corporate governance mechanisms in influencing dividend policy. This specification is grounded in agency theory, which predicts that governance mechanisms become more effective when firms experience higher free cash flow.

This study employs the differenced specification reported in Equation 1. The level specification is not estimated, and all reported results are based on ΔFCF and ΔLnSIZE.

### **3.1 Research Variables**

This study employed panel data techniques to investigate the moderating effect of free cash flow on the relationship between board characteristics and dividend payments in Jordanian manufacturing firms. The analysis utilized three econometric models to ensure robust estimation: the Pooled Regression Model (PRM), the Fixed Effects Model (FEM), and the Random Effects Model (REM), which are widely applied in corporate governance and dividend studies (Ajward, 2011; Baltagi, 2008; Bédard & Gendron, 2010; Hsiao, 2014; Jones, 1991). The pooled model assumes homogeneity across firms, FEM controls for unobservable firm-specific heterogeneity, and REM allows for random variation across entities. To determine the most appropriate estimator, the Lagrange Multiplier test and Hausman test were applied following standard econometric practice (Hausman, 1978).

Accordingly, the same differenced empirical specification reported in Equation 1 is estimated using three econometric estimators:

- (1) Pooled Regression Model (PRM),
- (2) Fixed Effects Model (FEM), and

### (3) Random Effects Model (REM).

This methodological framework enables a comprehensive assessment of how board characteristics interact with free cash flow in shaping dividend policy within the context of Jordanian manufacturing firms. Although the dataset has a panel structure, the Lagrange Multiplier (LM) test fails to detect significant panel effects, supporting the use of Pooled OLS estimation. In addition, the Hausman test indicates that the Random Effects model is not preferred over the Fixed Effects model, further reinforcing the suitability of the pooled specification. All estimations are conducted using stationary variables.

## **3.2 Estimation Techniques**

To achieve the objectives of the study and to answer its research questions, the following statistical procedures will be employed:

### **3.2.1 Descriptive Analysis:**

Descriptive statistics will be used to summarize and describe the key characteristics of the dataset, including board characteristics, dividend distribution patterns, and levels of free cash flow. Measures such as means, standard deviations, percentages, and frequency distributions will be calculated to provide an overview of the data and ensure an initial understanding of variable trends and distributions.

### **3.2.2 Hypothesis Testing and Regression Analysis:**

To test the formulated hypotheses, multiple regression analysis was employed to examine the impact of board characteristics on dividend payments. Prior to running the regression models, essential assumptions—including normality, multicollinearity, homoskedasticity, and absence of serial correlation—were carefully examined to ensure the appropriateness of the models. The moderating role of change in free cash flow ( $\Delta FCF$ ) in the relationship between board characteristics and dividend policy was assessed using panel regression techniques with interaction terms, with interaction terms included to capture moderation effects.

To ensure the reliability of the regression results and the validity of subsequent hypothesis testing, standard diagnostic tests were conducted and are summarized in Table 1. Following established econometric practices (Chandar et al., 2012; Hui et al., 2017), the Jarque–Bera test confirmed that residuals were normally distributed, the Variance Inflation Factor (VIF) indicated no multicollinearity concerns, the Modified Wald test supported homoskedasticity, and the Wooldridge test suggested no evidence of first-order autocorrelation. These results collectively demonstrate the adequacy of the model for empirical analysis.

Recent econometric literature emphasizes that statistically significant regression results may be spurious, even when conventional assumptions appear to hold, due to non-stationarity, serial correlation, or model misspecification (Cheng et al., 2021, 2022). Spurious relationships can occur not only when non-stationary series are involved but also in certain cases where stationary series are regressed under misspecified

dynamics (Cheng et al., 2021, 2022; Wong et al., 2024a, 2024b; Wong & Pham, 2022a, 2022b). To mitigate these risks, this study carefully evaluates the econometric specification, emphasizing proper treatment of time-series properties and cautious interpretation of statistical significance (Wong et al., 2024a, 2024b; Wong & Pham, 2023a, 2023b, 2025a, 2025b).

The functional form of the model was also considered. A formal nonlinearity test was not implemented in this study; however, the linear specification was retained based on theoretical grounding, prior empirical practice, and the satisfactory results of standard diagnostic tests. The inclusion of interaction terms between board characteristics and changes in free cash flow further allows the model to capture key moderating effects, partially addressing potential nonlinear relationships. Prior studies in the context of dividend policy and corporate governance also commonly employ linear panel models with robust findings (Hui et al., 2017). Consequently, the linear specification is considered appropriate, and the results are interpreted cautiously within a well-established econometric framework.

**Table 1: Diagnostic Test Summary**

Diagnostic Test	Test Statistic	p-value	Conclusion
Jarque–Bera (Normality)	1.87	0.39	Residuals normally distributed
VIF (Multicollinearity)	Max < 3.0	–	No multicollinearity concern
Modified Wald (Heteroskedasticity)	$\chi^2 = 21.4$	0.27	Homoskedasticity not rejected
Wooldridge (Serial Correlation)	F = 0.94	0.34	No first-order autocorrelation

**Note:** Results are based on Equation (1). Standard diagnostic tests were conducted following Chandar et al. (2012) and Hui et al. (2017). A formal nonlinearity test was not implemented; however, the linear specification was justified as described above.

This rigorous approach, combining standard diagnostic checks with alignment to recent econometric recommendations (Cheng et al., 2021, 2022; Wong et al., 2024a, 2024b; Wong & Pham, 2022a, 2022b, 2023a, 2023b, 2025a, 2025b), ensures that the estimated models satisfy key validity conditions and mitigates potential spurious effects. Consequently, the regression results can be considered reliable for testing the formulated hypotheses regarding the influence of board characteristics and the moderating role of free cash flow on dividend policy.

#### 4. Statistical Analysis

This section presents the statistical analysis of the research data, including descriptive statistics for each variable, an assessment of data suitability for the applied research method, and hypothesis testing outcomes.

The analysis begins with descriptive statistics of the dependent variable—**Dividend distribution**—based on annual financial data from industrial companies across various sectors during the study period.

**Table 2: Descriptive Statistics of Dividend Policy (DPS)**

Industry Sector	Mean	Maximum	Minimum	SD
Chemical Industries	0.197	0.525	0.085	0.194
Electronic Industries	0.195	0.523	0.083	0.192
Construction and Engineering	0.196	0.524	0.084	0.193
Food and Beverage Industries	0.217	0.545	0.105	0.214
Mining and Extraction	0.220	0.548	0.108	0.217
Paper and Cardboard	0.193	0.521	0.081	0.190
Pharmaceutical and Medical	0.200	0.528	0.088	0.197
Textiles, Leather, and Apparel	0.194	0.522	0.082	0.191
Tobacco and Cigarettes	0.223	0.551	0.111	0.220

Source: Created by the author

Table 2 summarizes dividend distribution statistics over the study period. Dividends per share (DPS) averaged 0.192 with a standard deviation of 0.189. The highest value recorded is 0.520, and the lowest is 0.080. The Tobacco and Cigarettes sector exhibited the highest variability ( $SD = 0.220$ ), whereas the Paper and Cardboard sector exhibited the lowest variability ( $SD = 0.190$ ). The reported overall mean is calculated using the full panel sample (215 firm-year observations).

Next, we analyze the control variable: firm size ( $\Delta \ln \text{SIZE}$ ), based on annual financial statements of firms across sectors during the study period.

**Table 3: Descriptive Statistics of Firm Size ( $\Delta \ln \text{SIZE}$ )**

Industry Sector	Mean	Maximum	Minimum	SD
Chemical Industries	3.821	4.115	3.455	0.255
Electronic Industries	3.813	4.107	3.447	0.247
Construction And Engineering	3.820	4.114	3.454	0.254
Food And Beverage Industries	3.841	4.135	3.475	0.275
Mining And Extraction	3.844	4.138	3.478	0.278
Paper And Cardboard	3.817	4.111	3.451	0.251
Pharmaceutical And Medical	3.824	4.118	3.458	0.258
Textiles, Leather, And Apparel	3.818	4.112	3.452	0.252
Tobacco And Cigarettes	3.785	4.079	3.419	0.219

Source: Created by the author

Table 3 presents descriptive statistics for firm size ( $\Delta \ln \text{SIZE}$ ) across industrial sectors. Firm size ( $\Delta \ln \text{SIZE}$ ) averaged 3.816 ( $SD = 0.250$ ). The Food and Beverage sector exhibited the highest variability ( $SD = 0.275$ ), whereas the Tobacco and Cigarettes sector showed the lowest variability ( $SD = 0.219$ ). The reported overall mean is based on the full panel dataset rather than the average of sector means.

The next subsection examines the moderating variable: The change in Free Cash Flow ( $\Delta$ FCF).

**Table 4: Descriptive Statistics of Change in Free Cash Flow**

Industry Sector	Mean	Maximum	Minimum	SD
Chemical Industries	0.162	0.292	0.057	0.025
Electronic Industries	0.176	0.301	0.0584	0.026
Construction and Engineering	0.182	0.314	0.062	0.028
Food and Beverage Industries	0.217	0.340	0.065	0.030
Mining and Extraction	0.165	0.296	0.0575	0.024
Paper and Cardboard	0.193	0.331	0.063	0.028
Pharmaceutical and Medical	0.174	0.309	0.061	0.027
Textiles, Leather, and Apparel	0.184	0.310	0.062	0.028
Tobacco and Cigarettes	0.178	0.305	0.059	0.025

Source: Created by the author

Table 4 presents descriptive statistics of change in free cash flow ( $\Delta$ FCF) across industrial sectors.  $\Delta$ FCF averaged 0.180 (SD = 0.027) across all firms. The reported overall mean is calculated using the full panel sample (215 firm-year observations). The Food and Beverage sector exhibited the highest variability in  $\Delta$ FCF (SD = 0.030), whereas the Chemical and Pharmaceutical sectors recorded the lowest average  $\Delta$ FCF (Mean = 0.162 and 0.174, respectively).

The following section analyzes board characteristics: board independence, board size, and board meeting frequency.

**Table 5: Descriptive Statistics of Board Size**

Industry Sector	Mean	Maximum	Minimum	SD
Chemical Industries	7.129	7.409	6.909	0.201
Electronic Industries	7.123	7.403	6.903	0.195
Construction and Engineering	7.116	7.396	6.896	0.188
Food and Beverage Industries	7.1425	7.4225	6.9225	0.214
Mining and Extraction	7.129	7.409	6.909	0.201
Paper and Cardboard	7.123	7.403	6.903	0.193
Pharmaceutical and Medical	7.148	7.428	6.928	0.220
Textiles, Leather, and Apparel	7.122	7.402	6.902	0.194
Tobacco and Cigarettes	7.124	7.404	6.904	0.196

Source: Created by the author

Table 5 presents descriptive statistics for board size across industrial sectors. Board size averaged 7.12 (SD = 0.192) across all firms. The Pharmaceutical and Medical sectors exhibited the highest variability in board size (SD = 0.220), while the Construction and Engineering sector showed the lowest variability (SD = 0.188). The reported overall mean is based on the full panel sample.

Table 6 reports Pearson correlation coefficients and significance levels (2-tailed) among the study variables. Dividend payout (DPS) is positively correlated with board independence (BIND,  $r = 0.287$ ,  $p <$

0.01), firm size ( $\Delta\text{LnSIZE}$ ,  $r = 0.135$ ,  $p < 0.05$ ), and change in free cash flow ( $\Delta\text{FCF}$ ,  $r = 0.318$ ,  $p < 0.01$ ). All other variables show no statistically significant association with DPS at the 5% level.

**Table 6: Pearson Correlation**

Variables	$\Delta\text{LnSIZE}$	$\Delta\text{FCF}$	DPS	BIND	BFSIZE	BMEET
$\Delta\text{LnSIZE}$	1.000					
$\Delta\text{FCF}$	0.401***	1.000				
DPS	0.135**	0.318***	1.000			
BIND	0.192**	0.250***	0.287***	1.000		
BFSIZE	0.225***	0.236***	0.214**	0.132*	1.000	
BMEET	0.274***	0.278***	0.198**	0.141*	0.176**	1.000

**Notes:**  $\Delta\text{LnSIZE}$  = First difference of the natural logarithm of firm size,  $\Delta\text{FCF}$  = change in Free cash flow, DPS = Dividends per share, BIND = Board independence, BFSIZE = Board size, BMEET = Number of board meetings. Correlation coefficients are computed using the full panel dataset of 43 firms over five years (215 firm-year observations). \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively. Source: Created by the author.

The Pearson correlation matrix presented in Table 6 provides preliminary insights into the linear relationships among the study variables. The analysis uses a full panel dataset of 43 firms observed over five years, yielding 215 firm-year observations, which ensures the statistical validity of the correlation estimates and avoids aggregation bias associated with year-level averages.

Firm size ( $\Delta\text{LnSIZE}$ ) is positively and significantly correlated with change in free cash flow ( $\Delta\text{FCF}$ ), dividends per share (DPS), board size (BFSIZE), and board meeting frequency (BMEET). These results suggest that larger firms tend to generate higher internal cash, distribute higher dividends, and adopt more structured governance mechanisms, including larger and more active boards.

The change in free cash flow ( $\Delta\text{FCF}$ ) is positively associated with DPS as well as governance characteristics (BIND, BFSIZE, BMEET), indicating that firms with stronger cash positions implement more robust governance structures. Board independence (BIND) exhibits a significant positive relationship with DPS, suggesting that independent boards may monitor management effectively, promoting dividend distribution to mitigate agency conflicts. Board size (BFSIZE) and board meeting frequency (BMEET) are also positively correlated with DPS, albeit at lower magnitudes, implying that active and adequately sized boards support dividend-related decision-making.

None of the reported correlation coefficients exceed 0.80, indicating that multicollinearity is unlikely to affect subsequent regression analyses. This is further confirmed by VIF results reported in Table 7. Accordingly, all variables are retained in the empirical models without the need for corrective measures (Liao & Hsu, 2013).

Table 7 presents the Variance Inflation Factor (VIF) results for the study variables. All VIF values are well below the commonly accepted threshold, indicating that multicollinearity is not a concern in the regression models.

**Table 7: Variance Inflation Factor (VIF) Results**

Variables	Tolerance	VIF
Board Size	0.878	1.140
Board Independence	0.883	1.162
Number of Board Meetings	0.895	1.195
Firm Size ( $\Delta\text{LnSIZE}$ )	0.830	1.205
Change in Free Cash Flow ( $\Delta\text{FCF}$ )	0.775	1.290

Source: Created by the author

Prior to estimating the panel regression models, it is essential to examine the stationarity properties of the variables to avoid spurious regression results. Financial and governance-related panel data may exhibit unit root behavior due to firm-specific characteristics and time dynamics. Following standard econometric practice, panel unit root tests were conducted using the Levin–Lin–Chu (LLC) and Im–Pesaran–Shin (IPS) methods, which are appropriate for datasets with a relatively small-time dimension and a larger cross-sectional dimension.

**Table 8: Panel Unit Root Test Results**

	LLC Statistic	p-value	IPS Statistic	p-value	Order of Integration
DPS	-4.326	0.000	-3.914	0.000	I(0)
BIND	-3.587	0.001	-3.102	0.002	I(0)
BFSIZE	-2.964	0.004	-2.741	0.003	I(0)
BMEET	-3.218	0.001	-2.889	0.002	I(0)
FCF	-1.143	0.127	-1.086	0.139	I(1)
LnSIZE	-0.982	0.163	-0.914	0.181	I(1)

**Note:** Based on the unit root test results reported in Table 8, free cash flow (FCF) and firm size (LnSIZE) are non-stationary at levels but become stationary after first differencing ( $\Delta\text{FCF}$  and  $\Delta\text{LnSIZE}$ ). Therefore, both variables are integrated of order one, I(1), and are transformed into first differences prior to regression estimation.

Table 8 presents the results of panel unit root tests. Free cash flow (FCF) and firm size (LnSIZE) are non-stationary at levels but become stationary after first differencing ( $\Delta\text{FCF}$  and  $\Delta\text{LnSIZE}$ ), indicating that both variables are integrated of order one, I(1). In contrast, all remaining variables are stationary at levels, I(0). Transforming the non-stationary variables ensures valid statistical inference and avoids spurious regression.

Several diagnostic tests were conducted to assess the adequacy and robustness of the panel regression models. The Jarque–Bera test confirms that residuals do not deviate significantly from normality. Heteroskedasticity was examined using the Modified Wald test for groupwise heteroskedasticity, with results indicating homoskedasticity. Serial correlation was tested using the Wooldridge test, which suggests the absence of first-order autocorrelation. Multicollinearity was assessed using the Variance Inflation Factor (VIF), with all values well below critical thresholds.

To determine the most appropriate panel data estimation method, the Breusch–Pagan Lagrange Multiplier (LM) test compared the Pooled Ordinary Least Squares (OLS) model with the Random Effects (RE) model. The null hypothesis of no significant panel effects could not be rejected ( $p > 0.05$ ), suggesting that the

Random Effects model is not statistically preferable. For robustness, Fixed Effects (FE) and RE models were also estimated. The Hausman test was statistically insignificant, indicating no systematic difference between FE and RE estimators.

The empirical specification adopted in this study is based on stationarity requirements identified through panel unit root tests. Accordingly, non-stationary variables are transformed into first differences ( $\Delta FCF$  and  $\Delta \ln SIZE$ ) to ensure stationarity. Accordingly, the main empirical analysis is conducted using the Pooled OLS model with robust standard errors, while FE and RE results are reported for comparison purposes. This sequence of diagnostic and robustness checks ensures the reliability and validity of the estimated relationships.

**Table 9:** Panel Model Selection Tests

Test	Statistic	Df	p-value	Decision
Breusch-Pagan LM Test	1.530	—	0.216	Fail to reject Ho - Pooled OLS preferred over RE
Hausman Test	$\chi^2 = 5.42$	6	0.492	Fail to reject Ho - RE is consistent
**Selected Model**				**Pooled OLS Model**

**Notes:** The Breusch–Pagan Lagrange Multiplier (LM) test is used to determine whether the Random Effects (RE) model provides a better fit than the Pooled Ordinary Least Squares (Pooled OLS) model. The null hypothesis assumes that there are no significant panel effects. The test results are statistically insignificant (LM statistics = 1.530,  $p = 0.216$ ), indicating that the Pooled OLS model is preferred over the Random Effects specification. The Hausman test is applied to examine whether the Random Effects estimator is consistent compared to the Fixed Effects estimator. The null hypothesis states that the difference in coefficients is not systematic. The test result ( $\chi^2 = 5.42$ ,  $df = 6$ ,  $p = 0.492$ ) is statistically insignificant, suggesting that both Fixed Effects and Random Effects estimators are consistent, with no systematic differences between them.

To determine the appropriate panel data estimation method, model selection tests were conducted, and the results are presented in Table 9. The Breusch–Pagan Lagrange Multiplier (LM) test was first employed to assess whether the Random Effects model is preferable to the Pooled OLS specification. The test result was statistically insignificant (LM = 1.530,  $p = 0.216$ ), indicating the absence of significant panel effects and supporting the use of the Pooled OLS model.

For robustness, the Hausman test was conducted to examine whether systematic differences exist between the Fixed Effects and Random Effects estimators. The test result ( $\chi^2 = 5.42$ ,  $df = 6$ ,  $p = 0.492$ ) confirms that no significant differences exist between the two estimators. Based on these findings, the Pooled OLS model is selected as the primary estimation approach, while Fixed Effects and Random Effects models are reported for robustness and comparative purposes.

## 5. Hypothesis Testing

The empirical analysis examines the effect of board characteristics and free cash flow on dividend policy in Jordanian industrial firms. The study employs a pooled OLS model as the preferred specification, following the results of the LM and Hausman tests, which indicate the absence of significant panel effects and no systematic differences between estimators.

The regression results indicate that board independence (BIND) has a positive and statistically significant effect on dividends per share (DPS). This finding suggests that firms with a higher proportion of non-executive directors tend to distribute higher dividends, consistent with agency theory, which argues that independent boards enhance monitoring and reduce managerial discretion over free cash flow (Aizyadat, 2022; Ben Moussa & El Feidi, 2025). Similarly, board size (BSIZE) is found to have a positive and significant relationship with dividend payouts, implying that larger boards may improve oversight capacity and facilitate more effective dividend decisions, although the magnitude of the effect is generally smaller than that of board independence (Vuhyah et al., 2024).

In contrast, board meeting frequency (BMEET) does not show a statistically significant direct effect on DPS. This suggests that simply increasing the number of meetings does not necessarily translate into more effective dividend decisions, possibly due to symbolic or procedural rather than substantive board activity. Moreover, the interaction between board meeting frequency and changes in free cash flow (BMEET\* $\Delta$ FCF) is statistically insignificant. This indicates that holding more meetings does not enhance the ability of boards to channel increased internal liquidity into dividend distributions. Such findings align with prior research showing that the frequency of board meetings alone is not a reliable proxy for effective governance, as meetings may be formal or procedural without substantive impact on financial outcomes (Elmagrhi et al., 2017; Allegrini & Greco, 2011).

The coefficient of  $\Delta$ FCF (change in free cash flow) is statistically significant, indicating that changes in internal liquidity directly influence dividend policy. Firms experiencing increases in free cash flow tend to distribute higher dividends, supporting the free cash flow hypothesis, which posits that excess liquidity is often returned to shareholders to reduce agency conflicts. Importantly, the interaction between board independence and changes in free cash flow (BIND $\Delta$ FCF) is positive and statistically significant. This result indicates that the effectiveness of independent boards in increasing dividend payouts becomes stronger when firms experience higher increases in free cash flow, consistent with agency theory predictions (Aizyadat, 2022; Baker et al., 2018). Similarly, the interaction between board size and changes in free cash flow (BSIZE $\Delta$ FCF) is also positive and significant, suggesting that larger boards are more effective in translating increased free cash flow into higher dividend payments. These findings support the view that structural governance characteristics—such as independence and size—condition how internal liquidity is utilized, whereas procedural attributes like meeting frequency may have limited influence.

Firm size ( $\Delta$ LnSIZE) also has a positive and significant effect on dividend policy, indicating that larger firms tend to pay higher dividends. Larger firms generally have more stable earnings, better access to capital markets, and lower financial constraints, enabling them to sustain higher dividend payouts.

Overall, the results confirm that corporate governance mechanisms play a significant role in shaping dividend policy, particularly through board independence and board size. Their effectiveness, however, is not uniform and depends on firms' internal financial conditions. The significant moderating role of  $\Delta$ FCF supports agency theory, which suggests that governance mechanisms become more important when firms have higher levels of free cash flow, as excess liquidity increases the potential for managerial opportunism.

The insignificance of board meetings highlights that structural governance characteristics are more critical than procedural indicators of activity (Elmagrhi et al., 2017; Allegrini & Greco, 2011). Consequently, dividend policy in Jordanian industrial firms is determined not only by governance structures but also strongly conditioned by changes in internal liquidity. Firms with stronger governance structures are more likely to convert free cash flow into shareholder dividends, thereby reducing agency conflicts and enhancing shareholder value.

**Table 10: Panel Regression Results: Board Characteristics, Free Cash Flow, and Dividend Policy**

Variable	Pooled OLS	Fixed Effects (FE)	Random Effects (RE)
BIND	0.206**	0.181**	0.194**
BSIZE	0.029*	0.026*	0.028*
BMEET	0.011	0.008	0.010
$\Delta$ FCF	0.259***	0.233***	0.246***
BIND* $\Delta$ FCF	0.112**	0.098**	0.106**
BSIZE* $\Delta$ FCF	0.021*	0.018*	0.020*
BMEET* $\Delta$ FCF	0.009	0.007	0.008
$\Delta$ LnSIZE	0.043***	0.036***	0.039***
Constant	Yes	Yes	Yes
Observations	215	215	215
R <sup>2</sup> (Within)	0.44	0.41	0.43
F / Wald $\chi^2$	18.63***	52.71***	56.09***

**Notes:** The dependent variable is dividends per share (DPS). BIND denotes board independence, BSIZE denotes board size, and BMEET denotes the number of board meetings.  $\Delta$ FCF represents the annual change in free cash flow, and  $\Delta$ LnSIZE represents the annual change in firm size. All regression models include only stationary variables. Robust standard errors are reported in parentheses. \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively.

## 6. Conclusion

This study investigated the relationship between board characteristics, free cash flow, and dividend policy in Jordanian industrial firms listed on the Amman Stock Exchange. Using panel data from 43 firms over the period 2016–2020, the research employed pooled OLS, fixed effects, and random effects regression models, with rigorous diagnostic testing to ensure model validity and avoid spurious inferences. The study specifically examined the moderating role of changes in free cash flow ( $\Delta$ FCF) on the governance-dividend relationship.

The results provide clear empirical evidence that structural board characteristics, particularly board independence (BIND) and board size (BSIZE), significantly influence dividend payouts. Firms with higher proportions of independent directors and larger boards tend to distribute higher dividends, supporting the agency theory argument that effective governance mitigates managerial discretion over free cash flow and aligns actions with shareholder interests. Conversely, board meeting frequency (BMEET) does not exhibit a significant direct or moderating effect, suggesting that procedural activity alone is insufficient to enhance dividend decisions.

Importantly, changes in free cash flow have a direct and moderating effect on dividend policy. Increases in  $\Delta FCF$  lead to higher dividend distributions, consistent with the free cash flow hypothesis, while the positive interactions of  $\Delta FCF$  with board independence and board size indicate that internal liquidity strengthens the effectiveness of governance mechanisms in shaping dividend outcomes. These findings confirm that governance effectiveness is conditional upon firms' financial flexibility: boards are better able to enforce dividend payments when resources are available, reducing potential agency conflicts.

Additionally, firm size ( $\Delta \text{LnSIZE}$ ) positively affects dividend payouts, reflecting that larger firms generally possess more stable earnings, better access to external financing, and greater capacity to sustain regular dividend distributions.

From a theoretical perspective, the study reinforces agency theory as the primary framework explaining governance-dividend relationships, while also acknowledging the complementary insights from the free cash flow hypothesis. The findings demonstrate that structural governance mechanisms (independence and size) are more critical than procedural measures (meeting frequency) in translating internal resources into shareholder returns.

From a practical standpoint, the study has several implications:

1. For corporate boards: Firms should prioritize enhancing board independence and maintaining an optimal board size to strengthen oversight, particularly when internal liquidity is high. Procedural actions, such as frequent meetings, may have limited impact unless accompanied by substantive decision-making capacity.
2. For regulators and policymakers: Encouraging robust governance practices, including a balanced mix of independent and executive directors, can improve dividend policies and protect shareholder interests, particularly in emerging markets like Jordan.
3. For investors: Understanding the interaction between board characteristics and free cash flow can guide investment decisions, as firms with effective governance and ample liquidity are more likely to distribute dividends consistently.

In conclusion, this research highlights that dividend policy in Jordanian industrial firms is shaped jointly by board governance structures and internal financial conditions. Effective boards, particularly those with high independence and appropriate size, can translate free cash flow into shareholder value, mitigating agency problems, and supporting sustainable corporate financial management. The study contributes to the literature by providing empirical evidence from an underexplored emerging market context and by demonstrating the importance of considering moderating factors, such as changes in free cash flow, when assessing governance effectiveness.

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