

Ownership Concentration and Extreme Downside Risk: The Mediating Role of Landbanking in Property Development Firms

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Abstract

This study examines how controlling ownership and landbanking intensity jointly influence firms' exposure to extreme downside risk among publicly listed property development firms in Indonesia. The study extends the corporate governance literature by focusing on tail-risk outcomes and by identifying strategic asset allocation as an important mechanism linking ownership structure to corporate resilience. Using panel data from Indonesian listed property firms, extreme downside risk is measured by Expected Shortfall at the 5% level (ES5). Panel regression analysis is employed to test the relationships among controlling ownership, landbanking intensity and tail-risk exposure, while mediation analysis is used to assess the indirect effect of controlling ownership through landbanking decisions. The findings reveal that controlling ownership is negatively associated with both extreme downside risk and landbanking intensity, while landbanking intensity is negatively related to tail-risk exposure. Furthermore, the mediation results indicate partial mediation, suggesting that controlling shareholders strengthen firms' resilience to severe market downturns both directly and indirectly through more disciplined landbanking strategies. These results imply that investors, managers and policymakers should jointly consider ownership structure and landbanking decisions when evaluating firms' vulnerability to adverse market shocks. Governance mechanisms that encourage disciplined asset allocation may improve corporate resilience during periods of market stress. This study contributes to the literature by integrating corporate governance and real estate asset management in explaining firms' exposure to extreme downside risk, and by conceptualizing landbanking as a governance-mediated real options mechanism through which ownership structures shape firm resilience.

Keywords: *Ownership Concentration, Landbanking; Extreme Downside Risk, Expected Shortfall, Corporate Governance, Property Development Firms, Strategic Asset Allocation.*

Introduction

Venture capitalists invest in ideas, start-ups and companies that are in the nascent stage of growth, which means that they are generally in the pre-revenue stage (1). Private equity investors invest in relatively larger companies that are more established and are in the post-revenue phase (2). Though both venture capital and private equity investors invest in various forms of equity, the nature of investment risk is defined by the stage at which the respective company is (3).

Venture capital investment holds a far greater risk than private equity investment as such venture capital is invested in companies in the nascent stage, or even merely ideas that are yet to take the form of a company (2). On the other hand, private equity is invested in well-established companies that are already operating and generating revenue (as these private companies have moved on from the pre-revenue to the post-revenue stage) (4). The choice of the company's life cycle stage creates a major difference between venture capital and private equity as an investment. As both private equity

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and venture capital are invested in unlisted high-growth high-risk companies, the need to understand the relationship between investment and growth in high-risk start-ups with venture capital investment and established private companies with private equity investments becomes vital (4). Thus, it is imperative to examine the relationship between the returns of venture capital investments and those of private equity investments. This study reveals how the returns of high risk venture capital investments are related to the returns of private equity investments and whether they trigger growth opportunities for each other (5,6). This would also enlighten institutional investors about the impact of the growth of venture capital investment returns on the growth of private equity investment returns, and vice versa. Institutional investors give billions of dollars to venture capital and private equity funds, thus diversifying their portfolio in two different asset classes (7). For this very reason it is imperative to study the relationship between the venture capital and the private equity indices.

The study investigates the relationship between the returns of the Venture Capital Index and the Private Equity Index using vector autoregression and the DCC Garch model. The Granger causality test analyses the relationship between variables based on cause and effect. The cause-and-effect relationship will inform venture capitalists, private equity investors and institutional money managers about the ways in which venture capital and private equity investments reciprocally influence the growth of each other's returns. The DCC Garch model would help in determining the effect of immediate shocks on volatility, volatility persistence, asymmetry and reciprocal volatility transmission from one asset class to another.

Objectives:

To investigate whether there is any causal relationship between US private equity index and US venture capital index where US private equity index is the dependent variable.

To investigate whether a causal relationship exists between the US Private Equity Index and the US Venture Capital Index, with the latter serving as the dependent variable.

To investigate whether there is volatility transmission from the Venture Capital Index to the Private Equity Index.

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While the terms "venture capital" and "private equity" have been used interchangeably in various business circles, these concepts refer to very different approaches to business investments. Venture capital has become an essential part of the business environment (8,9). They offer financial support to companies in their formative stages, which can be done by investing money in a company, allowing it to grow and succeed, or buying a stake in its stock (10,11). On the other hand, private equity refers to a form of investment that involves the purchase of a company by an individual or group of individuals who do not have any operational control over the company.

There is presently no evidence that states how venture capital index returns and private equity index returns are interrelated. The study aims to inform investors as to what to expect from the performance of the Venture Capital Index based on the performance of the Private Equity Index and vice-versa. Venture capital is invested in early stage start-ups. This study investigates the impact of the performance of such start-ups on the returns of more established companies, which raised capital in the form of private equity.

Also, when more established private companies perform well, we investigate the impact on the returns of the less-established pre-revenue start-ups. This way investors of equity capital in unlisted companies would be informed as to what to expect in terms of performance and the relationship between the performance of the private equity and the venture capital indices. Venture capital and private equity funds can be classified into three categories, including stage-based, geography-based and industry-based funds. At an academic level, such findings would aid in further research in different countries, as well as different kinds of venture capital and private equity funds.

Literature Review

Ownership structure is a central issue in corporate governance because it shapes managerial incentives, monitoring effectiveness, and strategic risk-taking (12,13). Agency theory argues that conflicts between managers and shareholders may lead to inefficient investment, overexpansion, or

excessive risk when managerial discretion is weakly monitored (14,15). In firms with dispersed ownership, shareholders often face collective-action problems that reduce their ability to supervise managers effectively (16). As a result, managers may pursue projects that maximize private benefits rather than long-term firm value.

Concentrated ownership can mitigate these agency conflicts by strengthening monitoring and aligning managerial decisions with the interests of large shareholders. Controlling owners generally possess stronger incentives to preserve firm value because they hold substantial and often undiversified stakes (17,18). This creates incentives to avoid strategic actions that may expose the firm to severe losses. Such monitoring mechanisms are particularly relevant in emerging markets where legal protection, disclosure quality, and external governance institutions may be less developed. In these settings, controlling shareholders often exert direct influence over investment policy, financing decisions, and risk management practices.

However, ownership concentration does not always reduce risk. Controlling shareholders may also pursue aggressive expansion, tunneling, or projects that generate private benefits of control. These incentives can increase leverage, reduce transparency, and amplify firm vulnerability during adverse market conditions. Therefore, the net effect of controlling ownership on firm risk depends on whether monitoring incentives dominate opportunistic behavior.

This issue becomes more important in property development firms because the industry is characterized by long investment cycles, high leverage, illiquid assets, and strong sensitivity to macroeconomic fluctuations. Property developers commit substantial capital to land acquisition and project development, while revenues are often realized only after long delays (19). During downturns, falling asset prices, slower sales, and tighter credit conditions may generate severe financial distress. Consequently, governance systems that encourage discipline and long-term planning are expected to reduce firms' exposure to extreme downside outcomes (20).

Extreme downside risk captures a firm's vulnerability to rare but severe losses beyond conventional volatility measures (21). Unlike standard risk indicators, tail-risk metrics focus specifically on worst-case scenarios that threaten financial stability and market valuation (22). Investors increasingly price downside risk exposure because firms vulnerable to negative tail events are perceived as riskier and less resilient (23). If controlling shareholders constrain excessive risk-taking and promote prudent strategic choices, ownership concentration should reduce firms' exposure to extreme downside risk.

Landbanking refers to the acquisition and retention of undeveloped land for future development projects (24). In the property industry, land reserves are strategic assets because they determine future project pipelines, growth opportunities, and market positioning (25). Firms with substantial landbanks may respond more flexibly to favorable market conditions by accelerating development when prices rise or demand improves (26).

From a resource-based perspective, land reserves may create competitive advantage because access to strategically located land is limited and difficult for competitors to replicate (27). Developers that secure land early may benefit from lower acquisition costs, future scarcity rents, and stronger bargaining power (28). At the same time, landbanking involves considerable trade-offs. Large land inventories tie up capital in illiquid assets, increase financing needs, and expose firms to market downturns if land values decline.

Ownership structure is likely to influence these trade-offs. Controlling shareholders often have strong influence over capital allocation decisions, including land acquisition and project timing (29,30). Because they bear substantial firm-specific risk, they may prefer disciplined landbanking policies that avoid excessive asset accumulation and unnecessary leverage. Concentrated ownership can therefore reduce managerial tendencies toward empire-building or speculative land hoarding (31–33).

Nevertheless, controlling shareholders may also support landbanking when it strengthens long-term strategic positioning, particularly in markets with land scarcity, zoning restrictions, or rising urban demand. Early land acquisition may secure future growth opportunities and protect the firm from future price escalation (34). Thus, the relationship between controlling ownership and landbanking reflects a balance between growth incentives and financial discipline. In emerging property markets such as Indonesia, where regulatory constraints and ownership concentration are common, controlling shareholders are expected to favor more selective and disciplined landbanking rather than excessive land accumulation. This leads to the following hypothesis.

Property markets are cyclical and strongly affected by interest rates, credit conditions, income growth, and investor sentiment (35). During expansions, rising prices and strong demand encourage firms to increase development activity and accumulate land reserves (36). During contractions, however, falling asset values and tighter financing conditions can generate substantial pressure on developers.

The relationship between landbanking and extreme downside risk can be explained through real options theory. Undeveloped land provides developers with flexibility because projects can be delayed, scaled down, or rescheduled until market conditions improve (37). This timing option allows firms to avoid irreversible investments during unfavorable conditions, thereby reducing exposure to severe downside outcomes (38). Properly managed land reserves therefore function as a strategic buffer against uncertainty.

On the other hand, excessive landbanking may increase downside risk. Large land inventories lock capital into illiquid assets, increase carrying costs, and often require external debt financing (38). If market prices fall sharply or credit markets tighten, firms with heavy land commitments may face refinancing difficulties and significant valuation losses. In this sense, landbanking can create financial rigidity that worsens downside exposure during crises.

Thus, landbanking has both risk-reducing and risk-increasing characteristics (39). The final effect depends on whether strategic flexibility outweighs the financial burden of holding land reserves. In markets where timing flexibility is valuable and firms manage landbanks prudently, the benefits of landbanking are likely to dominate (40). This suggests that disciplined landbanking may reduce firms' vulnerability to extreme downside events.

Corporate governance often affects firm outcomes indirectly through strategic decisions rather than only through direct monitoring mechanisms (41). In property development firms, one of the most important strategic decisions is landbanking because land reserves determine future growth capacity, financing requirements, and exposure to market cycles (42). Therefore, landbanking can serve as an intermediate channel linking ownership structure to firm risk outcomes.

If controlling ownership influences how much land a firm acquires and retains, and landbanking subsequently affects exposure to severe downside losses, then landbanking operates as a mediating mechanism. Through stronger oversight and more disciplined asset allocation, controlling shareholders may limit excessive land accumulation while preserving valuable growth options. This can improve resilience during downturns and reduce tail-risk exposure.

This perspective extends the governance literature by emphasizing that ownership structures shape risk not only directly, but also through operational and investment policies. In real estate firms, where land assets are central to business strategy, the mediation effect of landbanking is expected to be particularly important.

Data and Methodology

3. Research methods

3.1 Research Design and Sample

This study uses a quantitative, explanatory approach with panel data analysis to examine how governance, strategy, and risk are interrelated in Indonesian listed property companies. The aim is to assess the direct impact of controlling ownership on extreme downside risk and the indirect impact mediated through landbanking intensity.

The sample includes publicly listed property development companies on the Indonesia Stock Exchange (IDX). A purposive sampling method was used to ensure data consistency and comparability. Firms qualified if they (1) had been continuously listed since 2013, (2) had not been delisted or under extended trading suspension, (3) maintained their industry classification within the property sector, and (4) provided complete financial, ownership, and stock return data.

Using these criteria, 19 firms were selected. From 2013 to 2023, the dataset includes 209 firm-year observations, forming a balanced panel. This period features several phases of the Indonesian property cycle: expansion, regulatory tightening, and the COVID-19 downturn, which allows for an assessment of governance impacts under different market conditions.

Financial and ownership data were collected from annual reports and IDX disclosures, while daily stock returns and macroeconomic data were sourced from publicly available financial databases. Panel data analysis is especially effective for examining the governance strategy risk connection in this research. It combines cross-sectional and time-series data, enabling the study to account for unobserved firm-specific traits that could influence risk exposure but remain consistent over time. These traits might include management practices, corporate culture, or long-term strategic goals, which are difficult to measure using only cross-sectional data. Additionally, panel models allow for the analysis of internal firm changes by tracking how ownership structures and strategic asset allocations evolve over time. This approach improves the reliability of empirical findings by reducing omitted-variable bias and helps distinguish between enduring firm effects and broader market trends.

The use of panel data is particularly appropriate for this study, as it allows for controlling for unobserved firm-specific heterogeneity that may influence both strategic decisions and risk exposure. By exploiting both cross-sectional and time-series variation, panel regression models enable a more robust examination of the relationships among ownership structure, landbanking, and extreme downside risk. This approach also allows the analysis to capture firm-specific dynamics and adjust for time-invariant characteristics that are difficult to observe directly.

The Indonesian property sector provides valuable practical insights for this study. Emerging markets like Indonesia are characterized by relatively concentrated ownership and developing corporate governance systems. In many listed companies, controlling shareholders hold significant influence over strategic and financial decisions, including investment policies and asset allocation. At the same time, the Indonesian property market has experienced notable cyclical shifts driven by macroeconomic factors, regulatory changes, and variations in credit availability. These conditions create an environment in which governance structures and strategic landbanking decisions can significantly affect firms' vulnerability to extreme downside risks.

3.2 Variable measurement

Extreme downside risk is assessed using Expected Shortfall at the 5% tail level (ES5). Consistent with standard tail-risk methods, Value at Risk (VaR) is first defined as the 5th percentile of the annual distribution of daily stock returns. Expected Shortfall is then calculated as the average of returns below this threshold, capturing the severity of losses in the most adverse situations of the return distribution.

Unlike VaR, which only indicates the cutoff point for losses, Expected Shortfall captures the severity of losses beyond that threshold, offering a more comprehensive measure of tail risk. As a coherent risk measure, it meets key properties such as subadditivity and convexity, making it especially suitable for evaluating firm-level risk (Artzner et al., 1999; Acerbi and Tasche, 2002).

Expected Shortfall is particularly suitable for property development firms, where risk is often characterized by infrequent but severe negative shocks. Unlike traditional volatility measures, ES focuses explicitly on the magnitude of extreme losses, providing a more informative assessment of firms' vulnerability to adverse market conditions. This is especially relevant in real estate markets, where downturns can have prolonged and significant effects on firm performance and asset values.

This measure is especially important for asset-heavy and cyclical sectors like real estate development, where companies face infrequent but severe negative shocks. By emphasizing extreme downside outcomes, ES5 offers a more useful indicator of firms' vulnerability to market downturns than traditional volatility measures.

Controlling ownership (CS) is defined as the percentage share held by the largest shareholder at the end of the fiscal year. This measure reflects the level of ownership concentration within the company and indicates the extent of a dominant shareholder's influence over corporate decisions. In corporate governance research, having a controlling shareholder is seen as a key factor that affects monitoring efforts, managerial incentives, and strategic decision-making (Jensen and Meckling, 1976; Shleifer and Vishny, 1997).

A higher level of controlling ownership means a single shareholder holds significant voting power and can greatly influence the company's strategic and financial decisions. This influence can affect major investment choices, capital allocation, and risk management strategies. Since controlling shareholders often hold large, less diversified stakes, they have strong incentives to closely monitor management and prevent decisions that could expose the company to excessive risk. Additionally, concentrated ownership allows these shareholders to guide long-term strategies, including investment and asset allocation.

In property development firms, where strategic decisions often involve significant, irreversible investments in land and projects, controlling shareholders can play a crucial role in shaping the company's land-acquisition strategies and overall risk profile. Landbanking intensity (LB) is the proportion of land-related assets to a company's total assets, indicating the extent to which a property developer allocates resources to land reserves. In property development companies, land is a vital strategic asset because it influences the company's ability to pursue future projects and maintain a steady pipeline of real estate investments. As previous research on property development strategies shows, landbanking involves accumulating land resources to support upcoming projects and development opportunities (Ooi and Sirmans, 2004). Therefore, landbanking intensity is defined as the ratio of land-related assets to total assets.

Landbanking consists of two key components reported in companies' financial statements: Land Held for Future Development (LHFD) and Land Under Development (LUD). LHFD refers to undeveloped land parcels purchased and held for potential future projects, enabling developers to begin new developments when market conditions are right. LUD includes land parcels that are currently under development but are not yet fully completed properties. Together, these parts represent the land assets the company controls that support its future development plans.

By dividing total landbanking assets by total firm assets, the landbanking intensity measure indicates the relative importance of land reserves within the firm's asset structure. Higher values of this ratio suggest a stronger strategic focus on land accumulation, which could influence firms' exposure to property market cycles and financial risk.

Both components are based on the firms' year-end balance sheets. The ratio of total landbanking value to total assets shows the level of strategic land accumulation within the firm's asset structure. To examine the connection between controlling ownership, landbanking intensity, and extreme downside risk, the analysis includes various firm-level financial control variables commonly used in corporate risk and financial behavior studies. These controls help account for differences in firms' financial conditions that could influence both their investment decisions and their susceptibility to market volatility.

Liquidity, measured by the Current Ratio (CR), shows a company's ability to cover short-term liabilities with its current assets. Companies with higher liquidity generally have more financial flexibility and are better prepared to handle short-term market disruptions. In property development, liquidity also influences land procurement decisions, as firms with stronger short-term financial health are typically better able to invest in strategic land acquisitions.

Profitability, measured by Return on Assets (ROA), shows how efficiently a company earns from its assets. More profitable firms are likely to rely less on external financing and may have different risk profiles than less profitable firms. Additionally, profitability influences investment choices, such as landbanking, since firms with higher earnings may pursue more disciplined capital allocation strategies.

Leverage, as measured by the Debt-to-Equity Ratio (DER), indicates the extent to which firms rely on debt to fund their operations and investments. Higher leverage increases financial obligations and makes a firm more vulnerable to market downturns. This concept is especially important in asset-heavy industries like real estate development, where land purchases and project execution often involve significant debt.

Table I. Definition of variables

Variable	Definition	Measurement
ES5	Extreme downside risk	Expected Shortfall at the 5% tail level, measuring the average loss beyond the Value-at-Risk threshold
LB	Landbanking intensity	Ratio of land-related assets to total assets
CS	Controlling	Percentage shareholding of the largest shareholder at year-

	ownership	end
CR	Current ratio	Ratio of current assets to current liabilities, measuring short-term liquidity
ROA	Return on assets	Net income divided by total assets, measuring profitability
DER	Debt-to-equity ratio	Total debt divided by total equity, measuring leverage ratio
FOREX	Exchange rate	Annual change in exchange rate, capturing macroeconomic exposure

3.3 Model specification

To analyze the connections between controlling ownership, landbanking intensity, and firms' exposure to extreme downside risk, this study estimates the following panel regression models.

Model A: Controlling ownership and extreme downside risk

The first model examines the association between controlling ownership and firms' exposure to extreme downside risk:

$$ES5_{it} = \alpha_0 + \alpha_1 CS_{it} + \sum \alpha_k Controls_{it} + \varepsilon_{it}$$

where $ES5_{it}$ represents Expected Shortfall at the 5% tail level for firm i in year t , CS_{it} denotes controlling ownership, and Controls include firm-specific financial characteristics and macroeconomic variables.

Model B: Controlling Ownership and landbanking intensity

The second model examines whether controlling ownership is associated with firms' landbanking decisions:

$$LB_{it} = \beta_0 + \beta_1 CS_{it} + \sum \beta_k Controls_{it} + \mu_{it}$$

where LB_{it} represents landbanking intensity, measured as the ratio of land assets to total assets.

Model C: Landbanking, controlling ownership, and extreme downside risk

The third model incorporates landbanking intensity into the extreme-risk specification to examine whether landbanking accounts for part of the association between controlling ownership and extreme downside risk:

$$ES5_{it} = \gamma_0 + \gamma_1 CS_{it} + \gamma_2 LB_{it} + \sum \gamma_k Controls_{it} + \eta_{it}$$

In this specification, the coefficient on controlling ownership (γ_1) indicates the direct relationship between ownership concentration and extreme downside risk, while the coefficient on landbanking intensity (γ_2) shows how strategic land accumulation influences tail-risk exposure.

Firm (i) and year (t) subscripts are used throughout. All models are estimated using panel regression techniques with robust standard errors. Control variables include firm profitability, liquidity, leverage, and foreign exchange rate (forex).

3.4 Estimation strategy and statistical mediation assessment

This study examines whether landbanking intensity mediates the relationship between controlling ownership and firms' exposure to extreme downside risk. The mediation analysis is conducted using a two-equation approach.

First, landbanking intensity is regressed on controlling ownership and control variables to assess whether controlling shareholders influence firms' landbanking decisions:

$$LB_{it} = \beta_0 + \beta_1 CS_{it} + \sum \beta_k Controls_{it} + \mu_{it}$$

Second, Expected Shortfall at the 5% tail level is regressed on controlling ownership, landbanking intensity, and control variables:

$$ES5_{it} = \gamma_0 + \gamma_1 CS_{it} + \gamma_2 LB_{it} + \sum \gamma_k Controls_{it} + \eta_{it}$$

In this specification, the coefficient on controlling ownership (γ_1) captures the direct effect of controlling ownership on extreme downside risk, while the coefficient on landbanking (γ_2) reflects the mediating channel through which controlling ownership may influence risk outcomes.

Mediation analysis follows the steps outlined by Baron and Kenny (1986). To evaluate the significance of the indirect effect, tests such as Sobel (1982), Aroian (1947), and Goodman (1960) are used, along with modern methods like those from Preacher and Hayes (2008). These tests determine whether the product of the controlling ownership coefficient in the landbanking model and the landbanking coefficient in the risk model is significantly different from zero.

Evidence of mediation exists if (i) controlling ownership significantly impacts landbanking intensity, (ii) landbanking intensity is strongly associated with Expected Shortfall, and (iii) the indirect effect of controlling ownership on Expected Shortfall through landbanking is statistically significant.

FOREX is selectively included in various models. In the baseline extreme-risk model (Model A), the exchange rate (FOREX) captures how overall market conditions influence extreme stock returns. It is then excluded in later models to ensure stability in panel estimations.

Results and Discussions

Descriptive statistics

Table II presents the descriptive statistics of the variables. Ownership concentration (CS) remains relatively high, averaging 43.60%, reflecting the prevalence of concentrated ownership structures in the property sector. Landbanking intensity (LB) exhibits substantial variation across firms, indicating heterogeneity in strategic asset allocation and development planning.

Extreme downside risk (ES5) has a mean of 6.04 and considerable dispersion, suggesting that firms differ significantly in their exposure to severe adverse market conditions. This variation underscores the importance of focusing on tail-risk measures in asset-intensive and cyclical industries such as property development. Liquidity (CR) and profitability (ROA) indicate moderate financial performance, while leverage, measured by the debt-to-equity ratio (DER), varies widely across firms, pointing to differences in financing strategies. Exchange rate changes (FOREX) also display notable volatility, highlighting the role of macroeconomic factors in shaping firms' risk profiles.

Table II. Descriptive Statistics

Variable	Mean	Median	Std. Dev.	Min	Max
ES5	6.04	5.56	2.43	1.63	16.11
LB	21.57	16.47	17.17	0.14	71.40
CS	43.60	36.28	21.87	7.48	91.45
CR	2.73	2.20	1.89	0.30	11.90
ROA	3.74	3.50	2.74	-	12.80

Variable	Mean	Median	Std. Dev.	Min	Max
				2.80	
DER	28.36	23.80	27.88	0.00	139.46
FOREX	4.54	1.79	7.08	-	22.95
				2.34	

Correlation analysis

Table III reports the Pearson correlation coefficients among the variables. Controlling ownership (CS) is negatively correlated with landbanking intensity (LB), providing preliminary support for the expected relationship between ownership concentration and strategic asset allocation. Landbanking is also negatively correlated with extreme downside risk (ES5), suggesting that firms with greater land reserves may experience lower exposure to tail-risk outcomes.

The magnitude of all correlation coefficients remains below conventional thresholds, indicating that multicollinearity is unlikely to be a concern in the subsequent regression analysis.

Table III. Correlation Matrix

Variable	ES5	LB	CS	CR	ROA	DER	FOREX
ES5	1						
LB	-0.073	1					
CS	-0.085	0.169	1				
CR	0.077	0.471	-0.104	1			
ROA	-0.132	0.016	0.015	-0.222	1		
DER	-0.230	-0.225	-0.380	-0.030	-0.021	1	
FOREX	0.165	0.011	-0.110	-0.046	0.235	-0.007	1

Regression results and hypothesis tests

Tables IV–VI report the panel regression results from the three-stage empirical approach. The findings are presented as associations estimated with robust standard errors, and the selected panel specifications are based on standard model-selection criteria.

Table IV reports the relationship between controlling ownership and extreme downside risk. Consistent with H1, controlling ownership (CS) is negatively and significantly associated with ES5, indicating that firms with more concentrated ownership structures exhibit lower exposure to severe downside outcomes. This finding suggests that controlling shareholders may limit exposure to extreme downside risk through more disciplined strategic and financial decisions.

Among the control variables, leverage (DER), measured as the debt-to-equity ratio, is negatively and significantly linked to extreme downside risk. Exchange rate changes (FOREX) are positively and significantly related to ES5, while liquidity (CR) and profitability (ROA) are not statistically significant.

In economic terms, the magnitude of the coefficient suggests that increases in ownership concentration are associated with a meaningful reduction in extreme downside risk. This highlights the

practical relevance of governance structures in shaping firms' exposure to severe adverse outcomes, beyond mere statistical significance.

Table IV. Panel regression results: Controlling ownership and extreme downside risk (ES5)

Variable	Model A
Controlling ownership (CS)	-0.02** (0.01)
Current ratio (CR)	0.10 (0.10)
Return on assets (ROA)	0.02 (0.08)
Debt-to-equity ratio (DER)	-0.02*** (0.01)
Exchange rate (FOREX)	0.05*** (0.02)
Constant	7.10**
Observations	209
R ²	0.10
Estimation method	GLS
Panel model	Random effects

To further examine the mechanism underlying this relationship, Table V reports the regression results for landbanking intensity.

Table V shows that controlling ownership is negatively and significantly associated with landbanking intensity, supporting H2. This indicates that firms with more concentrated ownership structures tend to adopt more conservative land accumulation strategies.

Liquidity (CR) is positively and significantly related to landbanking, and leverage (DER) shows a positive and significant relationship as well. In contrast, profitability (ROA) is negatively associated with landbanking intensity.

Table V. Panel regression results: Controlling ownership and landbanking intensity (LB)

Variable	Model B
Controlling ownership (CS)	-0.10*** (0.02)
Current ratio (CR)	0.38** (0.15)
Return on assets (ROA)	-0.18* (0.09)
Debt-to-equity ratio (DER)	0.03* (0.01)
Constant	24.87***
Observations	209
R ² (within)	0.97

Variable	Model B
Estimation method	GLS
Panel model	Fixed effects

To assess the joint effect of ownership concentration and landbanking on tail-risk exposure, Table VI presents the combined regression results.

Table VI reports that landbanking intensity is negatively and significantly associated with extreme downside risk, supporting H3. This suggests that land reserves may function as a risk-buffering mechanism.

Controlling ownership remains significantly and negatively linked to ES5 even after accounting for landbanking, suggesting that ownership concentration's impact on tail-risk exposure is not completely mediated by landbanking choices. This offers preliminary evidence of partial mediation. Additionally, leverage (DER) maintains a negative and significant association with extreme downside risk.

Table VI. Panel regression results: Landbanking, controlling ownership, and extreme downside risk (ES5)

Variable	Model C
Landbanking intensity (LB)	-0.03** (0.01)
Controlling ownership (CS)	-0.03*** (0.01)
Current ratio (CR)	0.15 (0.10)
Return on assets (ROA)	0.06 (0.08)
Debt-to-equity ratio (DER)	-0.03*** (0.01)
Constant	8.20***
Observations	209
R ²	0.09
Estimation method	GLS
Panel model	Random effects

Table VII presents the mediation analysis results. The indirect effect is positive and statistically significant, as confirmed by the Sobel, Aroian, and Goodman tests.

The positive indirect effect reflects the combined impact of controlling ownership reducing landbanking intensity and landbanking, in turn, reducing extreme downside risk. This provides evidence of partial mediation, indicating that controlling ownership influences tail-risk exposure both directly and indirectly through landbanking decisions.

Table VII. Mediation test of landbanking in the relationship between controlling ownership and extreme downside risk (ES5)

Variable	Coef. (CS → LB)	Coef. (LB → ES5)	Indirect effect	Sobel Z	Aroian Z	Goodman Z
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Controlling ownership (CS)	-0.10***	-0.03**	0.0034	2.19**	2.16**	2.22**
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Discussion

The empirical evidence shows that greater ownership concentration is associated with lower exposure to extreme downside risk, indicating that firms with concentrated ownership structures are less vulnerable to severe tail-risk outcomes. From a corporate governance perspective, this finding supports the view that controlling shareholders possess both the incentives and the capacity to closely monitor managerial decisions and constrain risk-taking behavior. Consistent with agency theory (43,44), ownership concentration can mitigate conflicts between managers and shareholders by aligning strategic decisions with long-term firm stability.

This governance effect is particularly salient in property development firms, where investments are capital-intensive, long-term, and highly sensitive to market cycles. The limited redeployability of assets and the irreversible nature of development projects amplify firms' vulnerability to adverse market conditions (45,46). In this context, controlling shareholders who typically hold large and relatively undiversified stakes are more likely to prioritize downside protection and financial discipline, thereby enhancing firms' resilience to extreme market shocks.

Beyond direct monitoring effects, the findings highlight the role of governance in shaping firms' strategic asset allocation. Specifically, controlling ownership is negatively associated with landbanking intensity, suggesting that controlling shareholders tend to limit land accumulation (47). This behavior reflects an awareness of the trade-off between growth opportunities and financial exposure. While land reserves provide development potential, excessive landbanking can tie up capital and increase vulnerability during downturns (48). As a result, concentrated ownership appears to promote more disciplined asset allocation strategies.

At the same time, landbanking intensity is negatively associated with extreme downside risk, indicating that land reserves can serve as a strategic buffer. From a real options perspective, land holdings provide firms with flexibility in development timing, allowing them to delay, phase, or expand projects in response to changing market conditions (49,50). This flexibility can reduce financial pressure during downturns and enable firms to adapt more effectively to market fluctuations. Accordingly, landbanking plays a dual role: while excessive accumulation may create financial rigidity, a balanced level of land reserves can enhance firms' ability to withstand adverse shocks.

The coexistence of these effects highlights an important trade-off between governance and strategy. Controlling shareholders tend to restrain landbanking to maintain financial discipline, yet landbanking itself enhances risk resilience through its flexibility (51). This tension suggests that the risk implications of landbanking depend on how it is managed within the broader governance framework.

The governance strategy trade-off observed in this study reflects a broader tension between financial discipline and strategic flexibility in asset-intensive industries (52). While controlling shareholders appear to restrain landbanking to avoid excessive capital commitment and financial exposure, land reserves simultaneously provide valuable flexibility in managing development timing and project sequencing. This suggests that both under-investment and over-investment in landbanking may be suboptimal. Insufficient land reserves may limit firms' ability to respond to future market opportunities, while excessive land accumulation may increase financial rigidity and vulnerability to downturns. Therefore, the effectiveness of landbanking as a risk management tool depends not only on its scale but also on its governance and strategic deployment.

When landbanking is incorporated into the extreme-risk model, controlling ownership remains statistically significant, confirming that governance influences tail-risk exposure through multiple channels (53). The mediation analysis further shows that landbanking partially transmits the effect of ownership concentration on extreme downside risk. The positive indirect effect reflects the product of two negative relationships controlling ownership reduces landbanking, and landbanking reduces tail risk indicating that the indirect pathway operates alongside the direct effect. This pattern reinforces the

interpretation of partial mediation and highlights the strategic role of landbanking in linking governance to risk outcomes.

These findings contribute to the literature by demonstrating that ownership concentration affects firms' exposure to extreme downside risk not only through traditional monitoring mechanisms but also through strategic asset allocation decisions. By conceptualizing landbanking as a governance-mediated real options mechanism, this study extends corporate governance research beyond conventional risk measures and highlights the importance of tail-risk resilience in asset-intensive industries.

More broadly, these findings may extend beyond the property development sector to other asset-intensive industries characterized by long investment horizons and limited asset redeployability, such as infrastructure, energy, and capital goods. In these contexts, firms similarly face trade-offs between committing capital to long-term assets and maintaining flexibility in the face of uncertainty. The interaction between governance structures and strategic asset allocation decisions may therefore play a critical role in shaping firms' resilience to extreme adverse conditions across a wide range of industries.

An additional noteworthy finding is the negative association between leverage and extreme downside risk. While leverage is typically associated with increased financial risk, this result may reflect the disciplining role of debt, which constrains managerial discretion and limits excessive risk-taking. In asset-intensive sectors such as property development, debt financing may impose external monitoring and enforce more structured investment decisions, thereby reducing exposure to extreme downside outcomes. Alternatively, this relationship may capture differences in financing structures across firms, where more established developers with stable project pipelines are better able to utilize debt without increasing tail-risk exposure. This finding highlights the importance of considering institutional and sectoral context when interpreting the risk implications of leverage.

Importantly, tail-risk measures capture firms' exposure to rare but severe adverse states that are not reflected in conventional volatility metrics. By focusing on these extreme outcomes, the findings highlight how governance structures influence not only overall risk but also firms' vulnerability to economically significant downside events relevant to capital market valuation.

Conclusion

This study examines how controlling ownership and landbanking intensity jointly influence firms' exposure to extreme downside risk in publicly listed property development companies. Using Expected Shortfall as a measure of tail risk, the results show that higher ownership concentration is associated with lower exposure to severe adverse outcomes, suggesting that controlling shareholders promote financial discipline and constrain risk-taking behavior. The findings further indicate that controlling shareholders tend to adopt more restrained landbanking strategies, while landbanking itself is negatively associated with extreme downside risk. Mediation analysis provides evidence of partial mediation, showing that strategic asset allocation is a key pathway through which governance influences firms' tail-risk exposure.

These findings contribute to both corporate governance and property management research by demonstrating that ownership concentration shapes firms' risk profiles not only through monitoring mechanisms but also through the strategic configuration of long-term assets. In particular, the results position landbanking as a governance-mediated real-options mechanism through which controlling shareholders influence firms' strategic flexibility and resilience in cyclical property markets. By shaping the scale and timing of land accumulation, governance structures indirectly affect firms' capacity to absorb market shocks and manage development pipelines under uncertainty.

From a practical perspective, the results highlight the importance of evaluating ownership structure and landbanking strategies jointly when assessing firms' resilience to extreme market conditions. For investors, ownership concentration and landbanking intensity provide informative signals of firms' vulnerability to severe downside risk. For managers, the findings underscore the importance of aligning land acquisition decisions with long-term financial discipline and risk management objectives. Future research may extend this analysis by examining how governance and strategic asset allocation interact across different institutional settings and property market cycles.

In addition, the study does not fully address potential endogeneity concerns, including reverse causality and omitted-variable bias. For example, firms with lower risk profiles may attract different

ownership structures or adopt distinct landbanking strategies, which could influence the observed relationships. While the use of panel data helps mitigate some of these concerns, future research could employ more advanced identification strategies, such as instrumental variable approaches or dynamic panel models, to further strengthen causal inference.

Furthermore, the measurement of landbanking relies on financial statement proxies, which may not fully capture qualitative aspects such as land location, development stage, or strategic value. Future studies could incorporate more granular data on land characteristics to improve construct validity. Finally, the findings are based on firms operating in a specific institutional context, and the extent to which these results generalize to other markets with different governance environments and regulatory frameworks remains an open question.

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