



The Influence Mechanism of Board Informal Hierarchy on Corporate Short-Term Financing for Long-Term Investment: A Model Analysis

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Abstract. This study empirically examines the impact of informal board hierarchy on corporate short-term financing for long-term investment (SFLI) using a sample of A-share listed companies in Shanghai and Shenzhen stock exchanges from 2011 to 2023. We employ the long-term capital financing gap model to measure SFLI behavior. The findings reveal that informal board hierarchy significantly reduces SFLI. Mechanism analysis indicates that informal board hierarchy mitigates SFLI by alleviating information asymmetry, addressing agency problems, and curbing managerial overconfidence. Further analysis shows that the restraining effect of informal board hierarchy on SFLI is more pronounced in state-owned enterprises (SOEs) and firms with CEO duality. The conclusions provide valuable insights for strengthening board governance and optimizing corporate investment-financing decisions.

Keywords: Long-term Capital Financing Gap Model; Board informal hierarchy; Short-term Financing for Long-term Investment (SFLI); Investment-financing structure; Regression Analysis

1 Introduction

The widespread phenomenon of "Short-term Financing for Long-term Investment" (SFLI) in Chinese enterprises, which involves using short-term debt to fund long-term investments, exacerbates financial risks and may trigger systemic financial instability ^[1]. This issue stems from information asymmetry in financial markets, leading banks to prefer short-term lending, while firms actively opt for short-term debt due to financing costs and signaling incentives ^[2]. The informal hierarchy of corporate boards—an implicit order shaped by directors' social capital and reputation—may mitigate SFLI by improving decision-making efficiency and strengthening oversight (e.g., enhancing information transparency and curbing managerial opportunism) ^[3]. Using A-share data from 2011 to 2021, this study examines how board informal hierarchy influences SFLI

and its underlying mechanisms, contributing to research on informal institutions in corporate governance while offering theoretical insights for optimizing corporate financing structures and mitigating financial risks.

2 Literature Review and Research Hypotheses

Existing studies demonstrate that the "short-term financing for long-term investment" (SFLI) phenomenon in enterprises results from multiple interacting factors. At the macro level, institutional deficiencies such as imperfect financial systems, irrational interest rate levels^[4], and unstable monetary policies lead to insufficient long-term capital supply^[5], forcing firms to rely on short-term debt financing. At the micro level, managerial overconfidence underestimates refinancing risks^[6], directors' and officers' liability insurance may induce speculative behavior^[7], while internal control quality can effectively mitigate maturity mismatch^[8].

The informal hierarchy of the board of directors, as an implicit governance mechanism, primarily suppresses SFLI through three channels: First, it alleviates information asymmetry through social capital advantages^[9], with higher-ranking directors' diverse social networks providing more "soft information"^[10] and enhancing corporate information transparency^[11]. Second, it reduces agency costs through implicit authority structures^[12], constraining managerial opportunistic behavior^[13]. Third, it corrects cognitive biases in management through orderly decision-making processes^[14], curbing overconfidence-driven investment impulses^[15]. Based on relational contract theory and debt maturity matching theory, this study proposes:

H1: *Ceteris paribus*, board informal hierarchy inhibits corporate SFLI behavior.

3 Research Design

3.1 Sample Selection and Data Sources

This study selects the data of China's A-share listed companies in Shanghai and Shenzhen during the period of 2013-2023 as the initial sample, the data are obtained from CSMAR and WIND databases, and the sample data are processed in the following ways: (1) excluding the samples with missing data; (2) excluding the samples of the financial industry; (3) excluding the samples of the ST and *ST type of companies; and finally 21,679 sample data are obtained. In addition, this paper has carried out the shrinking of continuous variables with up and down 1% to eliminate the influence of extreme values on the research results of this paper. The raw data are collated with the help of Excel, and further data processing and empirical analyses are carried out through Stata16.0.

3.2 Definition of Variables

Explained Variables.

SFLI: Drawing on the methodology of Zhong Kai et al. (2016) [4], firms' SFLI is measured based on the funding gap of long-term capital to support long-term investment, which is calculated as:

$$\text{SFLI} = [\text{Cash Expenditures for Investment Activities} - (\text{Increase in Long-term Financing} + \text{Increase in Equity} + \text{Net Cash Flow from Operating Activities} + \text{Cash Inflow from Disposal of Fixed Assets})] / \text{Total Assets at the Beginning of the Period} \quad (1)$$

Explanatory Variables.

Board Informal Hierarchy. Drawing on the research of He and Huang [16], the Gini coefficient is used to measure the informal hierarchy of the board of directors.

$$\text{Gini} = \frac{2\text{cov}(y, r_y)}{N\bar{y}} \quad (2)$$

where Gini is the clarity of the board's informal hierarchy; y is the total number of part-time outside directors on the board, r_y is the rank ranking of the formation of board members who have part-time outside jobs, and N is the board size.

Control Variables.

In order to eliminate the influence of other factors, the following control variables are selected: company size (Size), gearing ratio (Lev), return on net assets (Roe), growth rate of operating income (Growth), shareholding concentration (Top1), proportion of institutional investors' shareholding (INST), two positions (Dual), whether it is a loss (Loss), and the company's years of experience (Age), sole director ratio (Indep), and also set two dummy variables for year (YEAR) and industry (INDUSTRY). The definitions of the specific variables are shown in Table 1.

Table 1. Variable Definition Table

type	symbol	name	Definition
explanatory variable	SFLI	short-term financing and long-term investment	In particular, equation (1)
explanatory variable	Gini	Informal layers of the Board	Measured using the Gini coefficient
	Size	Company size	Natural logarithm of total assets
	Lev	gearing	Total liabilities/total assets
control variable	Roe	return on net assets	Net profit/shareholders' equity balance
	Growth	Growth rate of operating income	Increase in operating income for the current year/operating income for the previous year

Top	shareholding concentration	Shareholding ratio of the largest shareholder
INST	Institutional investor holdings	Number of shares held by institutional investors/total number of shares of the company
Dual	two jobs in one	The same person as the chairman and general manager is 1, otherwise it is 0.
Loss	Is there a loss	Net profit for the year is less than 0 take 1, otherwise 0
Age	Number of years in the company	Natural logarithm of the number of years the business has been established
Indep	Proportion of independent directors	Number of independent directors/total number of directors
Industry year	dummy variables dummy variable	

3.3 Modelling

To test the effect of board informality hierarchy on firms' SFLI, the following model is constructed:

$$SFLI_{i,t} = \alpha_0 + \alpha_1 Gini_{i,t} + \alpha_2 Control_{i,t} + \sum Ind + \sum Year + \varepsilon_{i,t} \quad (3)$$

If the coefficient α_1 is significantly negative, it supports hypothesis H1, that is, the higher the clarity of the informal level of the board of directors, the lower the degree of corporate SFLI. Where $SFLI_{i,t}$ denotes the degree of SFLI, $Gini_{i,t}$ denotes the clarity of the board's informal hierarchy, $Control_{i,t}$ denotes the control variable, and $\varepsilon_{i,t}$ denotes the random error term.

4 Empirical Analysis

4.1 Descriptive Statistics

Table 2 presents the descriptive statistics. The mean value of SFLI is -0.096, indicating that listed companies generally exhibit a certain degree of SFLI. The minimum value is -1.065, and the maximum value is 0.264, suggesting significant variation in the extent of SFLI across different listed companies, with some exhibiting more severe behavior in this regard. The minimum value of the informal hierarchy of the board of directors (Gini) is 0.048, and the maximum value is 0.349. The considerable gap between these extreme values indicates clear differences in the clarity of informal board hierarchies among companies. Additionally, the statistics of the control variables included in the table all fall within normal ranges.

Table 2. Descriptive Statistics

variant	sample size	mean	median	standard deviation	minimum	maximum
SFLI	16600	-0.096	-0.074	0.199	-1.065	0.264
Gini	16600	0.165	0.157	0.066	0.048	0.349
Size	16600	22.26	22.06	1.264	20.06	26.35
Lev	16600	0.418	0.412	0.196	0.060	0.876
Roe	16600	0.048	0.068	0.477	-41.50	0.874
Indep	16600	0.375	0.333	0.053	0.333	0.571
Dual	16600	0.302	0	0.459	0	1
Top	16600	0.338	0.316	0.148	0.085	0.736
Age	16600	2.882	2.944	0.334	1.099	4.159
Inst	16600	0.391	0.398	0.238	0.001	0.884
Opinion	16600	0.980	1	0.140	0	1

4.2 Regression Analysis

Table 3 presents the regression results of the impact of the board's informal hierarchy on corporate short-term financing for long-term investment (SFLI). The regression coefficient between the board's informal hierarchy (Gini) and SFLI is -0.048, which is statistically significant at the 5% level. This indicates a negative correlation between the board's informal hierarchy and SFLI, meaning that a clearer informal hierarchy within the board helps suppress corporate SFLI behavior.

Table 3. Main effects test

variant	SFLI	t
Gini	-0.048**	(-2.02)
Size	-0.035***	(-21.30)
Lev	0.215***	(22.20)
Roe	-0.040***	(-12.67)
Opinion	-0.073***	(-6.92)
Top	0.022*	(1.87)
Indep	0.083***	(2.87)
Inst	-0.034***	(-4.44)
Dual	-0.005	(-1.56)
Age	-0.014***	(-2.67)
Constant	0.721***	(16.28)
Year/Ind	YES	-
N	16,600	-
adj_R ²	0.0855	-
F	18.22	-

Note: t-values in parentheses, *, ** and *** indicate that the correlation coefficients are significant at the 10 per cent, 5 per cent and 1 per cent levels, respectively, as below.

4.3 Mechanism Testing

In the previous research hypothesis, it is proposed that the informal hierarchy of the board of directors reduces firms' short-term financing and long-term investment behaviours by lowering the degree of information asymmetry, mitigating the agency problem, and suppressing managerial overconfidence. In order to verify the establishment of the mediating mechanism. The specific model is as follows:

$$Med_{i,t} = \beta_0 + \beta_1 Gini_{i,t} + \beta_2 Control_{i,t} + \sum Ind + \sum Year + \varepsilon_{i,t}$$

Where $Med_{i,t}$ is the mediating variable and the other variables are consistent with the previous section.

Information Asymmetry.

We construct a composite information asymmetry index (ASY) using liquidity ratios, illiquidity ratios, and return reversal metrics. Column (1) of Table 4 shows the board's informal hierarchy (Gini) has a significantly negative coefficient (1% level), confirming its role in mitigating information asymmetry. Prior literature links higher information asymmetry to intensified SFLI, supporting the mechanism that informal hierarchy curbs SFLI by reducing information gaps.

Agency Costs.

We measure agency costs via the management expense ratio (Mfee). Column (2) reveals Gini's significant negative coefficient (1% level), indicating informal hierarchy lowers agency costs. Agency theory suggests managerial self-interest (e.g., empire-building) exacerbates debt risks, forcing firms into SFLI. Results demonstrate informal hierarchy alleviates SFLI by constraining agency costs.

Managerial Overconfidence.

We build an overconfidence index (OC). Column (3) shows Gini negatively correlates with OC (5% level). Overconfident managers underestimate risks and favor SFLI, assuming short-term debts can be easily repaid. This validates informal hierarchy's SFLI-reduction effect via curbing overconfidence.

Table 4. Mechanism Tests on How Board Informal Hierarchy Affects SFLI

variant	(1) ASY	(2) Mfee	(3) OC
Gini	-0.081*** (-2.79)	-0.016** (-2.38)	-0.030** (-2.16)
Size	-0.197*** (-100.44)	-0.012*** (-27.09)	0.003*** (3.23)
Lev	0.308*** (26.30)	-0.048*** (-17.86)	0.014** (2.48)

Roe	-0.011*** (-2.83)	-0.010*** (-11.53)	-0.002 (-1.00)
Opinion	-0.010 (-0.78)	-0.033*** (-11.00)	-0.005 (-0.79)
Top	0.308*** (22.00)	-0.035*** (-10.67)	-0.032*** (-4.82)
Indep	-0.155*** (-4.41)	0.050*** (6.20)	-0.075*** (-4.56)
Inst	0.010 (1.04)	0.002 (0.89)	0.022*** (4.96)
Dual	-0.017*** (-4.25)	0.001 (1.23)	0.234*** (122.46)
Age	-0.003 (-0.53)	0.001 (0.79)	-0.016*** (-5.44)
Constant	4.078*** (75.97)	0.431*** (34.71)	0.564*** (22.38)
Year/Ind	YES	YES	YES
N	16600	16600	16600
adj_R ²	0.5559	0.3406	0.5056
F	231.62	96.16	189.39

4.4 Robustness Tests

Propensity Score Matching (PSM).

To address potential endogeneity caused by sample selection bias, this study employs Propensity Score Matching (PSM). The board's informal hierarchy (Gini) is treated as a continuous variable, and the control variables specified in this study are selected as matching covariates. Using the nearest-neighbor matching method, we match sample firms and conduct regression analysis on the matched sample. The results, reported in Table 5, show that the coefficient of the board's informal hierarchy (Gini) remains significantly negative, consistent with our baseline findings.

Lagged Independent Variable.

To further mitigate endogeneity concerns, we lag the board's informal hierarchy (Gini) by one period. The regression results presented in Table 5 demonstrate that the coefficient of the lagged board's informal hierarchy (Gini) on short-term financing for long-term investment (SFLI) is significantly negative at the 10% level, again confirming the robustness of our main results.

Additional Control Variables.

To account for potential omitted variable bias, we include two additional control variables: loss status (Loss) and firm growth (Growth). As shown in Table 5, even after adding these control variables, the coefficient of the board's informal hierarchy (Gini)

on SFLI remains significantly negative, further supporting the robustness of our conclusions.

Table 5. Robustness Tests

Variables	PSM	Lagged Independent	Additional Control
Gini	-0.050* (-1.92)		-0.038* (-1.74)
L. Gini		-0.046* (-1.71)	
Growth			-0.196*** (-53.05)
Loss			0.087*** (17.37)
Size	-0.035*** (-19.62)	-0.036*** (-19.74)	-0.027*** (-18.41)
Lev	0.215*** (20.48)	0.235*** (21.17)	0.190*** (21.02)
Roe	-0.035*** (-11.02)	-0.043*** (-11.50)	-0.017*** (-5.68)
Opinion	-0.076*** (-6.72)	-0.058*** (-4.88)	-0.018* (-1.87)
Top	0.028** (2.24)	0.028** (2.10)	0.034*** (3.28)
Indep	0.096*** (2.90)	0.074** (2.29)	0.060** (2.29)
Inst	-0.035*** (-4.23)	-0.032*** (-3.62)	-0.035*** (-5.05)
Dual	-0.004 (-1.10)	-0.007* (-1.87)	-0.002 (-0.63)
Age	-0.012** (-2.20)	-0.008 (-1.26)	-0.024*** (-5.16)
Constant	0.722*** (14.82)	0.723*** (14.43)	0.565*** (13.90)
Year/Ind	YES	YES	YES
N	14,121	12,611	16600
adj_R ²	0.0851	0.0884	0.2531
F	15.43	14.89	60.98

5 Conclusions

The debt risk of enterprises is related to the high-quality development of China's economy. The article takes A-share listed companies in Shanghai and Shenzhen from 2013 to 2023 as the research sample, and empirically examines the impact of board of directors' informal hierarchy on corporate SFLI. It is found that the informal level of the

board of directors can significantly inhibit the behaviour of SFLI, i.e., the higher the clarity of the informal level of the board of directors, the lower the degree of SFLI of enterprises. The mechanism analysis shows that the board informal hierarchy can mitigate SFLI by reducing information asymmetry, mitigating agency problems, and suppressing managerial overconfidence. Considering the differences in the internal and external governance environments of firms, further analysis reveals that the effect of the board informal hierarchy on SBL is more pronounced in state-owned enterprises (SOEs), and in the case of two-tiered governance.

Based on the conclusions of the above study, the following insights are obtained: (1) Relevant departments in China should pay attention to the regulatory role of informal mechanisms of listed companies, give better play to the decision-making and governance functions of the board of directors, encourage listed companies to establish and improve the system of informal hierarchy of the board of directors, optimise the internal structure of the board of directors, strengthen the trust and communication among the members, optimise the allocation of the term of investment and financing, and promote the long-term development of the enterprise. (2) Enterprises should pay attention to the important role of the invisible hierarchy formed based on social capital and personal influence when electing directors. On the one hand, it is necessary to regulate the governance system of the informal hierarchy, build an efficient decision-making mechanism between directors, and give full play to the supervisory function of the board of directors, so as to optimise the allocation of financial resources, and enhance the scientific and rationality of investment and financing decisions. On the other hand, it is necessary to ensure the diversification of the knowledge structure of the board of directors, pay attention to the establishment of social networks, and reduce short-term financings and long-term investment behaviours through the transmission of information and resource sharing among the linkage relationships. (3) Enterprises should consider the influence of the nature of property rights and the unity of two positions when making investment and financing decisions. Focus on the independence of the board's functions in decision-making, give full play to the resource advantages and integration capabilities of senior directors in the informal hierarchy, and promote orderly cooperation within the board of directors.

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