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Short-term cross-border capital flows and corporate leverage ratio: China's empirical evidence and enlightenment

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Abstract

In consideration of increasing global economic uncertainties and the leverage ratio of non-financial corporate sector in China reaching a historical peak, this paper uses the parallel multiple mediation model to analyze the mechanism and impact of cross-border short-term capital flows on non-financial corporate leverage in China, in which corporate borrowing and asset price are taken as mediators in parallel multiple mediation model. The research findings indicate that the influence of short-term cross-border capital flows on corporate leverage ratio in China is mainly through the direct path. The influence of the two indirect channels is relatively weak, in which the size of corporate borrowing is more influential than corporate asset price. The indirect impact of short-term cross-border capital flows on corporate leverage ratio is more significant for state-owned enterprises compared to non-state-owned enterprises.

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1. Introduction

Since the fourth quarter of 2022, China's government optimized its epidemic prevention and control policies, which leads to a strong market expectation of economic recovery and thus substantial short-term capital inflows back to China after significant outflows. In general, the short-term capital inflows would expand credit scale in the recipient countries [1], which may increase corporate leverage ratio. According to the National Institution for Finance & Development (NIFD) of China, the leverage ratio of China's non-financial corporate sector was 167% in the first quarter of 2023, reaching the highest level in history. As pointed out in [2], excessive leverage is detrimental to the development of corporations. Furthermore, uncontrolled credit growth increases the vulnerability of the financial market and is not conducive to macroeconomic stability [3]. Therefore it is necessary and meaningful to explore the impact of short-term cross-border capital flows on the leverage ratio of Chinese non-financial corporations so as to reveal the micro-level mechanism of short-term cross-border capital flows on Chinese non-financial corporate leverage and to serve as a good reference for policymakers to manage cross-border short-term capital flows more effectively to achieve a balance between economic growth and financial risk management.

2. Literature Review

Existing studies on the impact of short-term cross-border capital flows on corporate leverage mainly indicate that short-term cross-border capital inflows increase the supply of bank credit, provide non-financial firms more funds, and thus increase leverage ratios. Among these studies，Deniz Igan and Zhibo Tan [1] explored the impact of international short-term capital flows on credit to the non-financial corporate sector using a regression with a sample of 33 countries over the period 1980-2011. Their findings suggest that short-term cross-border capital inflows significantly increase the size of borrowing in the corporate sector.

Based on the study of Deniz Igan and Zhibo Tan, Gou Qin et al. [5] further extend the research perspective to corporate leverage, and investigate the impact and channels for the surge of short-term cross-border capital inflows on changes of non-financial corporate leverage with the data of non-financial firms in 47 economies from 2000-2015. To test the impact of equity surge and debt surge on the non-financial corporate leverage ratio, Gou Qin et al. use indirect analysis in which the corporate asset prices and the ratio of credit to GDP for the non-financial corporate sector are taken as mediating variables respectively. The findings show that surges of short-term cross-border capital significantly increases non-financial corporate leverage ratio, and further, equity surge pushes up non-financial corporate leverage ratio through asset price channel and debt surge pushes up non-financial corporate leverage ratio through both asset price channel and credit channel.

Other scholars, although not directly studying the impact of short-term cross-border capital flows on corporate leverage, have investigated the impact of macroeconomic factors such as exchange rates and interest rates on corporate leverage, since these factors play important roles in attracting short-term cross-border capital inflows [6][7]. For example, by using firm-level data for leverage from 10 emerging market economies during the period from 2002 to 2015, Sebnem Kalemli-Ozcan et al. [6] shows that corporations operating in countries whose non-financial sectors hold more of the debt in foreign currency, increase (decrease) their leverage relatively more after domestic currency appreciations (depreciations).

To our best knowledge, there are few works that directly investigate the impact of short-term cross-border capital flows on corporation leverage ratio, which is our interest in this paper. The work [5] investigates the indirect effect of the asset price and the ratio of credit to GDP for the non-financial corporate sector from cross-border capital inflows to corporation leverage. However, as a more direct factor that influences corporate leverage, the size of corporate borrowing is more reasonable to be chosen as a mediating variable in indirect analysis framework rather than the ratio of credit to GDP for the non-financial corporate sector. Since different factors take place simultaneously, a multiple indirect model may reveal more accurate relationships when indirect analysis is conducted, compared with simple indirect model used in [6].

The main contributions of this paper are as follows: First of all, we investigate the impact of short-term cross-border capital flows on the corporate leverage ratio using parallel multiple mediation model, which reveals the influencing mechanism and channels from the perspectives of direct and indirect pathways. Moreover, this study supplys a new method for Chinese government to utilize short-term cross-border capital flows for developing economy

while preventing corporate debt risks. As China has been the main engine of global economic growth, China's financial stability has great importance from nation-level and world-level, so it is vital to understand the relationship between short-term cross-border capital flows and corporate leverage ratio in China.

3. Research Method

3.1. Mechanisms Analysis

Short-term cross-border capital typically refers to capital that flows rapidly between international financial markets, driven by the pursuit of interest rate differentials, currency appreciation, and asset premiums, exhibiting strong profit-seeking and sensitivity characteristics[7]. Based on existing research, the mechanism by which short-term cross-border capital flows affect the corporate leverage ratio is summarized in Figure 1. When a country's financial market is relatively open and its economic growth is rapid, it is easy to attract large amounts of short-term cross-border capital inflows, which can affect the corporate leverage directly or indirectly through the financial markets. The mechanism of the indirect impact of short-term capital flows on corporate leverage is mainly interpreted as follows: Firstly, investors tend to invest short-term capital to capital markets such as stocks and real estate to pursue higher returns, which drives asset prices to rise [9]. As a result, firms may experience an increase in their stock prices, which can have a favorable effect on their ability to engage in equity financing [10] and lead to a relative increase in firm assets, thereby lowering the leverage ratio. Secondly, when asset prices rise, higher collateral prices increase firms' ability to borrow. From the perspective of banks, cross-border short-term capital inflows enhance market liquidity, thereby increasing the borrowing funds. Banks, in their efforts to expand their market share, may enlarge credit supply [1]. Consequently, when a large volume of international short-term capital flows into a country, it becomes easier for firms to increase their borrowing, resulting in higher debt levels and a corresponding rise in the leverage ratio.

The accumulation of high leverage during periods of short-term capital inflows renders the financial market more vulnerable [3]. When a country experiences a slowdown in economic growth or faces external shocks, it is prone to a reduction in short-term cross-border capital inflows or even large outflow [11], which will further deteriorate the domestic economic and financial environment, with rapidly falling asset prices, tightening domestic credit and difficulties in corporate financing. As a consequence, firms may be compelled to reduce their debt levels, leading to a decline in leverage and a decrease in output [11]. Moreover, higher corporate leverage increases debt repayment pressure, potentially causing an increase in non-performing borrowings for banks. If this accumulation reaches a certain threshold, it can trigger a banking crisis or even a financial crisis [14].
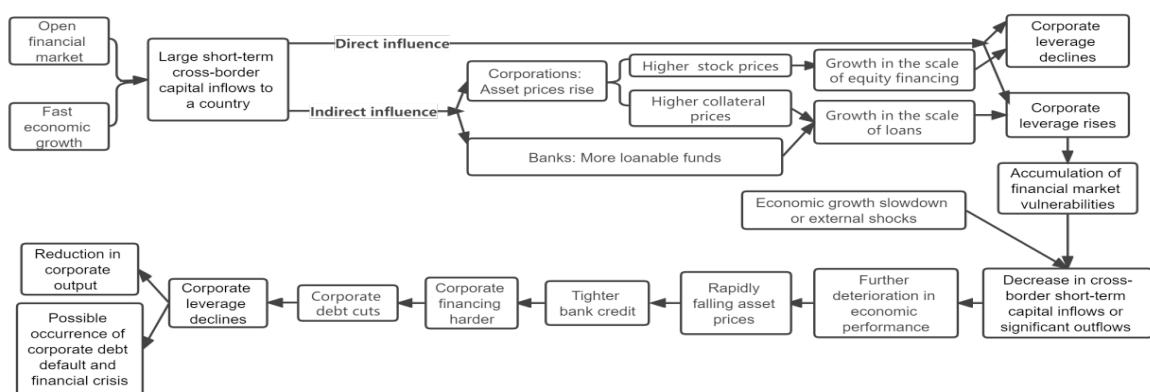

Fig. 1. Mechanisms of the Influence of Cross-Border Short-Term Capital Flows on the Leverage of Enterprises in a Country

3.2. Data Source

The corporate data used in this study is sourced from the CSMAR database and the sample is quarterly observations. Based on the research requirements and data availability, the sample selection criteria are as below: 1. The sample

period covers the years 2002 to 2022, as financial data for Chinese listed companies before 2002 mainly includes semi-annual observations, while most quarterly data are available after 2002. 2. Financial firms and ST (Special Treatment) companies are excluded from the sample. 3. Firms with negative leverage ratio and those with two consecutive years of missing data are also excluded. As a result, a total of 4,813 Chinese listed companies' quarterly data from 2002 to 2022 are selected as the sample for this study.

Data of cross-border short-term capital net flows is sourced from the balance of payments published by the State Administration of Foreign Exchange (SAFE) and are quarterly data. The methods on estimating the size of cross-border short-term capital net flows are mainly summarized as the direct method and the indirect method. Referring to the estimation ways of Cuddington and Zhang Ming et al. [8][13], this paper adopts direct estimation method to estimate the net flows of cross-border short-term capital.

3.3. Method

The determinants of corporate leverage ratio can be summarized into firm-level factors and macroeconomic factors based on existing research [5][6][7][15], so this paper selects the influencing factors from the above two aspects. Building upon the mechanism analysis above, the scale of corporate borrowing and asset prices play a indirect role in the influence of short-term cross-border capital flows on leverage in non-financial firms. Hence, using the parallel multiple indirect effects model sourced by Preacher and Hayes [16], this study constructs a set of equations (1) to (4) with corporate borrowings and asset prices as indirect variables for empirical analysis. The method can further investigate the mechanisms through which short-term cross-border capital flows affect leverage in non-financial firms of China.

$$LEV_{it} = \alpha_1 + \tau SCF_t + \delta_1 CL_{i,t-1} + \varphi_1 ML_{t-1} + \mu_i + \gamma_t + \varepsilon_{it} \tag{1}$$

$$DEB_{it} = \alpha_2 + \beta_2 SCF_t + \delta_2 CL_{i,t-1} + \varphi_2 ML_{t-1} + \mu_i + \gamma_t + \varepsilon_{it} \tag{2}$$

$$FSV_{it} = \alpha_3 + \beta_3 SCF + \delta_3 CL_{i,t-1} + \varphi_3 ML_{t-1} + \mu_i + \gamma_t + \varepsilon_{it} \tag{3}$$

$$LEV_{it} = \alpha_4 + \tau' SCF_t + \lambda_1 DEB_{it} + \lambda_2 FSV_{it} + \delta_4 CL_{i,t-1} + \varphi_4 ML_{t-1} + \mu_i + \gamma_t + \varepsilon_{it} \tag{4}$$

In the equation, the subscripts i and t represent individual firms and time, respectively. The dependent variable LEV_{it} represents the leverage ratio of firm i at time t, while the core explanatory variable SCF_t represents short-term cross-border capital net flows in China at time t. The indirect variables are DEB_{it} and FSV_{it}, representing the scale of corporate borrowings and asset prices, respectively. The control variables $CL_{i,t-1}$ and ML_{t-1} are firm-level and macroeconomic control variables, respectively. $CL_{i,t-1}$ includes firm size, the proportion of fixed assets, and profitability, while ML_{t-1} includes China's real GDP growth rate, inflation rate, and broad money supply growth rate. All control variables are lagged by one period to mitigate endogeneity. ε_{it} represents the error term. In this paper, firm fixed effects(μ_i) and time fixed effects (γ_t) are controlled, as well firm-level clustering standard errors are included in the regression equations to make the estimation results more reliable. Sample data are processed as follows: 1. Removing the upper and lower 1% of firm-level variables to mitigate the impact of outliers on empirical results. 2. Z-score standardization was applied to all variables. The definitions and descriptive statistics of the main variables are presented in Table 1.

Table 1. Variable definitions and summary statistics

Variable	Abbreviation	Description	Data Source	Mean	Std.dev
Leverage ratio	LEV	Refer to [11][12] expressed as the ratio of total liabilities to total assets of the enterprise.	CSMAR	0.473	3.995
Cross border short-term capital flows	SCF	Described in section 3.2 above.	SAFE	-7.114	7.818
Scale of corporate borrowing	DEB	The sum of long-term and short-term borrowings of the enterprise.	CSMAR	2.604	13.177

Corporate asset price	FSV	Quarterly average of monthly closing prices.	CSMAR	11.913	24.909
Corporate size	SCA	Log of total book assets.	CSMAR	21.946	1.366
Tangibility	TAN	Fixed assets as a percentage of total assets.	CSMAR	0.223	0.167
Real GDP growth rate	GDPS	Quarterly real GDP growth rate.	CEIC	7.391	3.642
Inflation rate	CPIS	Quarterly CPI growth rate.	CEIC	2.261	1.603
Broad money supply	MMS	Quarterly growth rate of broad money supply.	CEIC	12.955	4.461

The procedure for testing the parallel multiple mediation model is as follows: In the first step, equation (1) is estimated to test the significance of the regression coefficient τ. If τ is significant, the next step can be conducted. In the second step, equations (2) and (3) are simultaneously estimated to test the significance of the regression coefficients β_2 and β_3 for the indirect variables, namely, the scale of corporate borrowings and asset prices, respectively. If the coefficients β_2 and β_3 are significant, the next step is to estimate (4). In model (4) If the coefficients τ', λ_1, and λ_2 are all significant, and τ' is smaller than τ, it indicates a significant indirect effect of the scale of corporate borrowings and asset prices.

Regarding the analysis of the indirect effect and total effect: First, $\beta_2\lambda_1$ represents the indirect effect of the short-term cross-border capital flows on the corporate leverage ratio through the channel of corporate borrowings. Similarly, $\beta_3\lambda_2$ represents the indirect effect through the channel of asset prices. The sum of $\beta_2\lambda_1$ and $\beta_3\lambda_2$ represents the total indirect effects. Second, τ' represents the direct effect of short-term cross-border capital flows on the corporate leverage ratio. $\tau' + \beta_2\lambda_1 + \beta_3\lambda_2$ represents the total effect includes indirect and direct effects, which is the value of τ. Finally, the contributions of the indirect effects through the corporate borrowings channel, asset price channel, and direct effect to the total effect are given by $\beta_2\lambda_1/\tau$, $\beta_3\lambda_2/\tau$, and τ'/τ, respectively.

4. Empirical results

4.1. Full sample estimation

After determining the research sample and methodology, this section employs the parallel multiple mediation model to empirically analyse the influence of short-term cross-border capital flows on the corporate leverage ratio in China. The empirical results for the full sample are presented in Table 2[†].

Table 2. Empirical results for the full sample

Models for analysis	(1)	(2)	(3)	(4)
Variables	LEV	DEB	FSV	LEV
DEB				0.1213***
				(0.000)
FSV				-0.0115
				(0.164)
SCF	0.2110***	0.2072***	0.1192***	0.1818***
	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.0691***	-0.1352***	-0.2356***	0.0768***
	(0.000)	(0.000)	(0.000)	(0.000)
Corporate FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Observations	164,692	166,737	164,113	161,259
R-squared	0.187	0.28	0.293	0.202

The values in brackets in table 2 are the p-values corresponding to the regression coefficients. "*", "**" and "***" denote the coefficients are

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[†] Due to space limitations, the estimation results for the control variables are not shown in this section. Readers who require the estimation results can contact the authors of this paper.

significant at the 10%, 5% and 1% levels respectively. All models controlling for individual and time fixed effects. The following table has the same meaning as above.

The regression results in Table 2 show that, firstly, short-term cross-border capital inflows significantly increase the corporate leverage ratio in China (see column (1)). This is consistent with the mechanism analysis that large short-term cross-border capital inflows tend to cause a credit boom and economic overheating, with the expansion of corporate loan [1] and an increase in corporate leverage ratio.

Furthermore, the corporate borrowing channel has a positive indirect effect on the influence of short-term cross-border capital on the corporate leverage ratio in China, while the indirect effect of asset price channel is not significant. The regression results in columns (2) and (4) demonstrate that the corporate borrowing channel plays a significant positive mediating effect with an effect value of 0.0251 (0.2072 × 0.1213). This implies that short-term cross-border capital inflows lead to an expansion of corporate borrowing, indirectly increasing the corporate leverage ratio. This could be attributed to the fact that short-term cross-border capital inflows drive up asset prices, enhance the borrowing capacity of firms through increased collateral value, and increase the availability of bank borrowings due to improved market liquidity, resulting in increased corporate borrowing and higher leverage ratios [1]. The regression results in columns (3) and (4) indicate that the indirect effect of asset prices is not significant and has a negative effect, with an effect value of -0.00137 (0.1192 × (-0.0115)), implying that short-term cross-border capital inflows increase corporate asset prices, but an increase in corporate asset prices decreases corporate leverage ratios. This may be because when equity prices rise, firms can raise funds by issuing new shares or selling existing shares, which increases the firm's shareholders' equity and increases the firm's assets relatively, thus reducing leverage. The analysis above indicates that the overall indirect effect value of these two channels is 0.0238(0.0251 + (-0.00137)).

Finally, the influence of short-term cross-border capital flows on the corporate leverage ratio in China is mostly driven by direct path, with the indirect channel exerting little influence and the corporate borrowing is the main indirect channel. The direct effect of short-term net cross-border capital flows on the leverage ratio of Chinese enterprises is 0.1818 (see column (4)) and the total effect is 0.211 (see column (1)). In terms of the contributions of the mediating effects of the corporate borrowing channel, the asset price channel, and the direct effect to the total effect, their values are 11.91%, 0.65%, and 86.16% respectively. This indicates that the majority of short-term cross-border capital flows have a direct impact on the corporate leverage ratio in China, while a small proportion of short-term cross-border capital through the indirect channel. Among the indirect channels, the corporate borrowing channel plays a major role, while the asset price channel is relatively small.

4.2. State-owned versus non-state-owned enterprises

This section further divides the enterprises into state-owned and non-state-owned enterprises to explore the influence of short-term cross-border capital flows on the corporate leverage ratio in China with different equity characteristics. The results of the empirical analysis are shown in Table 3, where columns (1) to (4) displays the empirical results for the state-owned enterprises and columns (5) to (8) presents the regression results for the non-state-owned enterprises.

Table 3. Empirical results for Sub-samples

Samples	State-owned enterprises				Non-state owned enterprises			
Models for analysis	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	LEV	DEB	FSV	LEV	LEV	DEB	FSV	LEV
DEB				0.1826***				0.1681***
				(0.000)				-(0.006)
FSV				-0.0625***				0.016
				(0.001)				(0.690)
SCF	0.3241***	0.2393***	-0.3462***	0.2397***	0.4273***	0.1633*	-0.2399	0.4006***
	(0.000)	(0.000)	(0.000)	(0.000)	-(0.002)	-(0.082)	-(0.195)	-(0.002)
FE effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Observations	43,654	44,217	43,566	42,660	5,847	5,909	5,827	5,703
R-squared	0.241	0.314	0.451	0.272	0.149	0.342	0.422	0.174

The regression results in Table 3 indicate the following: First of all, short-term cross-border capital inflows significantly increase the corporate leverage ratio in China, both for state-owned and non-state-owned enterprises (as shown in models (1) and (5)). Besides, the channel of corporate borrowing plays a significant positive indirect effect in the impact of short-term cross-border capital on the corporate leverage ratio with effect values of 0.0437 (0.2393 × 0.1826) for state-owned firms and 0.0275 (0.1633 × 0.1681) for non-state-owned firms, respectively. The channel of asset prices only plays a significant positive indirect effect for state-owned enterprises with an effect value of 0.0216 (-0.3462 × (-0.0625)). It indicates that short-term cross-border capital inflows increase the leverage ratio of state-owned enterprises through the channel of asset prices. But for non-state-owned enterprises, the indirect effect of the asset price channel is statistically insignificant, with an effect value of -0.0038 (-0.2399 × 0.016). Taking the above analysis into consideration, the total indirect effect value of 0.0653 (0.0437 + 0.0216) for state-owned enterprises and 0.0237 (0.0275 + (-0.0038)) for non-state-owned enterprises.

Finally, Indirect channels have a greater impact on state-owned enterprises compared to non-state-owned enterprises, but the impact of short-term cross-border capital inflows on the leverage ratio of Chinese non-financial enterprises is mainly driven by direct effect. For state-owned enterprises, the contributions of the mediating effects of corporate borrowing, asset prices, and direct effects to the total effect are 13.48%, 6.66%, and 73.96%, respectively. For non-state-owned enterprises, the corresponding contributions of the three effects to the total effect are 6.44%, 0.89%, and 93.75%. These results indicate that the mediating effects on state-owned enterprises are larger than those on non-state-owned enterprises, possibly due to state-owned enterprises having easier access to bank credit and government support, when short-term cross-border capital flows into China, banks have increased borrowing funds and are more inclined to lend to state-owned enterprises, promoting the expansion of state-owned enterprises debt and higher leverage.

5. Robustness

Considering that corporate market value reflects market's evaluation of assets more accurately than stock prices, this section uses corporate market value as a proxy variable for company's asset price to test the robustness of the empirical results[‡]. The robustness tests conducted on the full sample and sub-samples show that the explanatory variables in the baseline model above are generally consistent with the estimates after replacing stock prices with market value, indicating that the estimates of the regression model are robust.

6. Conclusions

This paper explores the influence of short-term cross-border capital flows on the corporate leverage ratio in China and the influencing channels, using quarterly data from 2002 to 2022 for a sample of 4,813 listed companies. The main findings are as follows: firstly, short-term cross-border capital inflows significantly increase the leverage of non-financial firms in China. Moreover, the direct effect of short-term cross-border capital flows on corporate leverage ratio is more prominent than the indirect channels such as corporate borrowing or asset prices, and the corporate borrowing is the main indirect channel. In terms of the direction of indirect effect, short-term capital inflows expand corporate borrowing and indirectly rise the corporate leverage ratio. Additionally, the indirect effects of short-term cross-border capital flows on corporate leverage ratio is more significant for state-owned enterprises compared to non-state-owned enterprises. These findings above have two implications: On the one hand, China's financial regulatory authorities should enhance the supervision of short-term cross-border capital flows, which may lead to a rapid increase

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[‡] Due to space limitations, the results of robustness tests are not shown in this section. Readers who require the results can contact the authors of this paper.

of corporate leverage in response to large short-term capital inflows and debt defaults when there is a sudden capital outflows. These could result in severe financial market fluctuations and even global or regional financial crises. On the other hand, enterprises should broaden their financing channels and actively engage in bank credit financing while also appropriately engaging in equity financing, which not only provides more sources of capital for enterprise development but also diversifies debt risks to some extent.

Acknowledgements

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