VILNIUS TECH
Vilnius Gediminas Technical University

Journal of Business Economics and Management
ISSN 1611-1699 / eISSN 2029-4433
2022 Volume 23 Issue 1: 40–59
https://doi.org/10.3846/jbem.2021.15655

# STOCK LIQUIDITY AND CORPORATE TRADE CREDIT STRATEGIES: EVIDENCE FROM CHINA

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Received 10 March 2020; accepted 12 May 2021; first published online 30 November 2021

**Abstract.** This study investigates the nexus of stock liquidity and trade-credit policies in China from 2002 to 2017. The estimates are robust to alternative proxies, various fixed-effects, and the exogenous impact of Chinese split share structure reforms (SSSR) 2005-06 is investigated through the difference-in-difference analysis. The results validate that stock liquidity significantly impacts firms' capacity to produce more trade credit supplies and less reliant on trade credit demand. The study applied SUEST analysis to investigate the effect of the Chinese institutional setting. The nexus of stock liquidity and trade credit strategies is substantial in state-owned enterprises. Additional analysis revealed that the said association is more visible to credit-constrained and equity-reliant enterprises. The policymakers should focus on market liquidity because it elevates firms' capacity to mobilize capital through trade credit provisions. The micro aspect of this study suggests that stock liquidity allows managers to shape non-price competitive strategies and avoid excessive usage of trade credits.

**Keywords:** trade credit, stock liquidity, stock market, financial flexibility, equity financing, trading activity.

**JEL Classification:** G14, G32.

## Introduction

Trade credit is a type of short-term financing extended by one trader to another; on the one side, it enlarges firms' purchasing power, and on the other side, it expands trading volume. Many firms commonly use this source of financing in developed and emerging economies (Ferrando & Mulier, 2013). Extant literature unfolds the role of the debt market on enterprises' capacity to produce more trade credits (Chong & Yi, 2011; Shenoy & Williams, 2017; Tang & Moro, 2020). Few studies pay attention to the stock market's role in this context (Shahzad et al., 2021a). Small and private enterprises are more enthusiastic about exploiting trade-credit financing (Martínez-Sola et al., 2014). These firms are less efficient in the stock market (Guariglia et al., 2011). Therefore, the previous literature documents this

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unidimensional treatment. Few studies pay close attention to large and public enterprises in the context of trade credit financing (Cull et al., 2009; Molina & Preve, 2012; Murfin & Njoroge, 2015; Shang, 2020; Shenoy & Williams, 2017). These enterprises are highly efficient in stock trading, especially in emerging economies (Shahzad et al., 2020). Therefore, it is crucial to highlight the stock market's role and investigate the role of stock trading on capital redistribution through trade-credit financing.

The previous literature produces enough evidence that stock liquidity is a significant driver of investors' sentiments (Asem et al., 2016). Besides, stock liquidity has a considerable role in reducing the equity flotation cost (Butler et al., 2005). Firms with highly liquid stocks keep conservative leverage policies (Nadarajah et al., 2018; Udomsirikul et al., 2011). Therefore, firms exploiting the benefits of stock liquidity in raising the finance through stock trading may mobilize capital through trade credit provisions. The study prophesies that stock liquidity reinforces firms' capacity to produce more trade credit provisions, and it also protects firms relying less on trade credit supplies. It shapes the baseline hypothesis prophesizing a positive (negative) nexus of stock liquidity and trade credit supplies (demand). The study offers unique learning to comprehend the role of the stock market on informal capital mobilization. On the micro-level, managers need to realize how stock liquidity associate with firms' capacity to produce and utilize trade-credit provisions. Therefore, managers can exploit these benefits to shape their financial strategies. On a macro level, the study offers meaningful learning to policymakers to understand how market liquidity can promote informal banking and capital mobilization in financially deprived economic sectors. The current literature does not provide any conclusive findings; therefore, this study contends to fill this gap by empirically evaluating the nexus of stock liquidity and enterprise trade-credit strategies.

The study is applied in China. The enforcement of bankruptcy laws is ambiguous regarding creditors' rights, and political intervention often elevates the hazards for financial institutions recovering debts (Hanley et al., 2015). Therefore, debt opportunities skewed to the public sectors, and these issues stifle enterprise growth (Shahzad et al., 2021b). In 2005, the Chinese government introduced split share structure reforms (SSSR) to strengthen the stock market. These reforms allow firms to enlarge their trading volume by raising non-tradeable shares (Li & Zhang, 2011), facilitating private and foreign investors to participate in the stock market (Shahzad et al., 2021d). Besides, these reforms enlarged equity trading and stock liquidity by reducing the conflict of interests with private investors (Hou et al., 2012). The corresponding growth of the stock market in China offers an ideal setting to investigate the nexus of stock liquidity and trade credit strategies.

The study's contributions are as follows. First, the previous debate was skewed to the nexus of debt financing and enterprise trade-credit strategies exploring the role of the credit market (Danielson & Scott, 2004; Nilsen, 2002; Petersen & Rajan, 1997; Shenoy & Williams, 2017; Tang & Moro, 2020). This study unfolds the role of the stock market through the nexus of stock liquidity and trade credit policies. Second, extant studies contribute to the determinants of trade credit financing (Deloof & Jegers, 1999; Giannetti et al., 2011; Ng et al., 1999; Shahzad et al., 2021a). This study presents stock liquidity as a significant predictor of enterprises' trade credit policies. It implies an essential contribution to the literature on the in-kind theory of financing. Thirdly, the impact of stock liquidity on financial outcomes is

one of the crucial debates (Brogaard et al., 2017; Fang et al., 2009; Jayaraman & Milbourn, 2012; Lipson & Mortal, 2009; Shahzad et al., 2021a). This study identifies that informal financing (i.e., trade-credit strategies) is another critical financial policy that enterprises may regulate based on the stock liquidity. Finally, the informal banking role of financially strong non-financial firms on capital mobilization has invaluable significance for emerging economies (Garcia-Appendini & Montoriol-Garriga, 2013). In this context, this study contributes that stock market liquidity has a significant role in enabling corporations on the capital redistribution system in the overall economic setting.

The rest of this study is organized as follows. Section 1 reviews the previous literature. The following section reports the material and methods, section 3 presents the result, and finally, the study presents the conclusion.

## 1. Literature review and hypothesis development

Enterprise financial capacity drives trade-credit provisions (Schwartz, 1974). Extant literature unfolds the role of debt financing in this context (Casey & O'Toole, 2014; Chong & Yi, 2011; Cull et al., 2009; Lin & Chou, 2015; Nilsen, 2002; Psillaki & Eleftheriou, 2015; Tsuruta, 2015). Besides, many studies offer conclusive literature on large and public enterprises (Cull et al., 2009; Molina & Preve, 2009, 2012; Murfin & Njoroge, 2015; Shahzad et al., 2021a; Shang, 2020; Shenoy & Williams, 2017). These enterprises are highly efficient in stock trading, and this financial efficiency may drive their capacity to generate and utilize trade credits.

### 1.1. Capital market and trade credit policies

Equity financing has a significant role in obtaining financial flexibility, and it is an invaluable instrument to fuel corporate growth (Shahzad et al., 2021c). Stock trading can be a costly option because equity home biases and ambiguous information disclosure standards may promote adverse selection costs (Sercu & Vanpee, 2007). In this context, stock liquidity has a significant role in alleviating information asymmetry and shaping conservative leverage policies (Chen et al., 2020). Stock liquidity curtails firm default risk by improving stock price informational efficiency, and it also strengthens enterprise governance mechanisms (Brogaard et al., 2017; Chauhan et al., 2017).

Stock liquidity drives investors' sentiments (Asem et al., 2016) and dividend policies (Nguyen, 2020), and it is always associates with minimum equity floatation cost (Belkhir et al., 2020). It controls ex-ante stock excess return (Amihud, 2002; Li & Luo, 2019); therefore, the investors are enthusiastic about investing in those firms whose equity is highly liquid. The positive effects of stock liquidity on shareholder value reinforce effective governance (Cheung et al., 2015). To strengthen the capital market, the Chinese government introduced split share structure reforms (SSSR) in 2005-06, and these reforms allowed firms to raise their non-tradeable equity (Joyce, 2008). SSSR improved stock market efficiency (Beltratti et al., 2016; Li & Zhang, 2011), equity float, turnover, and trading volume (Hwang et al., 2018). The positive effects of SSSR also offer an attractive environment for enterprises to improve their stock liquidity (Qiao & Pukthuanthong, 2019). The literature mentioned above validates that

enterprises whose equity is highly liquid are efficient in raising capital through stock trading. This financial arrangement can mobilize trade credits, extend debt collection tenure, and less reliance on trade credit demand. In this context, this study postulates that stock liquidity has a significantly positive (negative) attachment with trade credit supply (demand); thus, the following hypotheses are framed:

H1: (Trade credits supply) Firms with high stock liquidity are more likely to increase the length of debtors' collection tenure, increasing the supply of trade credits to their debtors.

H2: (Trade credit demand) Firms with high stock liquidity are more likely to reduce creditors' payment tenure, reducing the demand side of trade credits from suppliers.

### 1.2. The institutional setting of Chinese enterprises, stock liquidity, and trade credit strategies

State-owned enterprises (SOEs) are the primary beneficiaries of the soft budget constraints in the Chinese institutional setting (Lin & Li, 2004); it smooths stock trading activities in SOEs. State ownership plays a dominant role in the capital market, and their political affiliation maximizes resource mobility (Lin et al., 1998). Government participation gradually assists firms in minimizing capital shortages and obstacles. In a transition economy, such as China, government participation ensures the accessibility of the primary resources (Li et al., 2006). The political agenda on national economic growth generates a high provision of implicit guarantee, ultimately controlling the risk of defaulting in SOEs (Li & Lu, 2016). The probability of survival in SOEs has a great attachment with government reputation in ensuring that the investment could not fail (Borisova et al., 2015). It ultimately reduces the expected risk premium (Faccio et al., 2006). Therefore, government engagement in stock trading can elevate investors' enthusiasm to invest more in SOEs and enjoy the benefits attached with government affiliation. Consequently, SOEs' equity offering often improves stock liquidity (Ding & Suardi, 2019); therefore, investors intend to buy less equity than private enterprises offer. Thus, the study expects that the explanatory power of H1 and H2 could be higher in SOEs than the private enterprises.

## 2. Material and methods

### 2.1. Data source

The financial statement data are sourced from the China Stock Market and Accounting Research (CSMAR) database, an extensive and accurate repository of all enterprises listed on the Shanghai and Shenzhen stock exchange since 1990 (Shahzad et al., 2021d). Consistent with the established data selection practice, the enterprises trading in the service and financial sector are dropped. The study also dropped negative values of equity and operating turnover and firms without data for a minimum of five accounting years. The daily stock return is used to measure stock liquidity. Following the previous practice, the study drops all firms whose equity trading is lower than 150 days during one specific year (Shahzad et al., 2021a). The final sample comprises 14666 firm-year observations, covering 2002–2017; Table 1 carries the detail.

Table 1. Final sample description

| Detail | Sample Size |
|---|---|
| Preliminary observations | 21937 |
| Less: Enterprises in the financial sector | 3541 |
| Less: Enterprises in the Service sector | 2123 |
| Less: Shareholder equity (negative values) | 173 |
| Less: Sales (negative value) | 242 |
| Less: Stock trading days less than 150 | 1192 |
| Final Sample | 14666 |
| SOEs | 7989 |
| Private Firms | 6987 |

## 2.2. Variable measurement

### 2.2.1. Stock liquidity

The measurement of stock liquidity is always slippery and elusive for several transactional properties of the market, including tightness (trading cost), depth (price impact), immediacy, and resiliency. The Amihud stock illiquidity ratio captures the price impact dimension of stock liquidity, one of the most effective proxies among twelve proxies examined by Goyenko et al. (2009). The Amihud stock illiquidity ratio is strongly associated with a TAO-based price impact beta-values (Hasbrouck, 2009). It is the preeminent method to measure daily cost-per-dollar-volume (Fong et al., 2017). Eq. (1) carries the detail.

$$\text{Amihud Illiquidity}_{\text{i.t}} = \frac{1}{TD_{i.t}} \times \sum_{d=1}^{TD} \frac{\left|DR_{i.d}\right|}{DV_{i.d}}. \tag{1}$$

The term *DR* is the absolute value of daily stock return, the term *DV* is the dollar volume of a specific firm on a particular day, and the term *TD* represents the number of business days of *i* firm in *d* days and *t* year. Eq. (1) can be highly skewed; thus, log transformation can normalize values (Edmans et al., 2013). Besides, few studies multiply the values of Amihud Illiquidity with minus one [Amihud illiquidity × –1] to simplify the empirical values (Shahzad et al., 2021a; Shang, 2020); thus, the factor can predict liquidity. The higher value represents the highest stock liquidity. The modified variable represents Amihud stock liquidity is used in this study, and it is denoted as ASL. Lesmond et al. (1999) introduced the zero return proxy (hereafter, zeros), which indicates the fraction of zero daily returns observed over the relevant year. The zero return proxy directly correlates with spread and transaction costs that ultimately impact equity return in the stock market (Ali et al., 2017). It is measured as the number of days with zero return divided by trading days over the fiscal year. The higher value denotes the highest illiquidity. The zero return proxy is multiplied by –1 and labeled as *LiqZero*.

### 2.2.2. Trade credit policies

Following the previous practice, the study used customers' collection days (CCD) and suppliers' payment days (SPD) as the proxy for trade credit supply and demand, respectively (Cheng & Pike, 2003; Niskanen & Niskanen, 2006; Shang, 2020). The variable CCD was measured as the ratio of account receivables to net sales and multiplied by 360 days. The highest days represent that firm is extending customers' collection days, increasing trade-credit supplies. The variable SPD is the ratio of account payables to the net sales multiplied by 360 days. The minimum days represent that the firm is faster to repay to the operating suppliers, decreasing trade credit demand.

### 2.2.3. Control variables

Besides the primary explanatory variable, several control variables were applied in the empirical analysis to control firm-specific, and year dummies were incorporated to control the systematic period effect. Table 2 carries the detail.

Table 2. Description of control variables

| Variables | Expected impact | Measurement | Citation |
|---|---|---|---|
| Size | CCD (+ve) & SPD (+ve) | Log transformed (total assets) | (Niskanen & Niskanen, 2006) |
| Age | CCD (–ve) & SPD (+ve) | Current Year – Listing year | |
| Growth | CCD (–ve) & SPD (–ve) | Assets growth | (Ferrando & Mulier, 2013) |
| Market value *(MBR)* | CCD (+ve) & SPD (–ve) | The ratio of the market value to the book value of assets | (Martínez-Sola et al., 2013) |
| Profitability *(ROA)* | CCD (–ve) & SPD (–ve) | Earnings before interest and tax scaled by total assets | (Shahzad et al., 2021a) |
| Debt Ratio *(DBR)* | CCD (+ve) & SPD (–ve) | Interest bearing debts scaled by total assets | |
| Cash Ratio | CCD (–ve) & SPD (–ve) | Cash and equivalence scaled by total assets | |
| Assets Tangibility *(AT)* | CCD (–ve) & SPD (–ve) | The ratio of the fixed assets to total assets | |
| R&D Intensity | CCD (+ve) & SPD (+ve) | The ratio of the R&D investment to total assets | |
| Market Share | CCD (–ve) & SPD (–ve) | The ratio of firms' sales to industrial sales as per the classification of CSMAR | (Hosseini-Motlagh et al., 2018) |

## 2.3. Research model

The study follows Shang (2020) and Shahzad et al. (2021a) to evaluate the linkage between stock liquidity and enterprises' trade-credit policies; Eq. (2) carries the detail.

$$\underbrace{TCP_{i,t}}_{\text{CCD\& SPD}} = \alpha + \beta_1 ASL_{i,t-1} + \sum_{j=10}^{n} \beta_j CV_{i,t-1} + \eta_i + \lambda_t + \varepsilon_{i,t}. \quad (2)$$

*TCP* represents the trade credit policies where *CCD* is trade credit supplies, and *SPD* is the trade credit demand. The term *ASL* denotes stock liquidity and the sign of $\sum_{j=10}^{n} CV$ signifies the explanatory variables used in this study. The terms $\eta_i$ and $\lambda_t$ denotes industry and time effect, respectively. The symbols of $\varepsilon$, *i,* and *t* represent error terms, firm, and specific year, respectively. The study applied fixed-effect regression modeling for estimations. The one period lag is taken to control time distant issues. Besides, the study also used a difference-in-difference (DID) approach to control the endogeneity. It is a quasi-experimental approach that evaluates the changes in outcomes over time between the treated and controlled group.

## 3. Results

### 3.1. Descriptive analysis

Table 3 reports descriptive estimates. The debtors' collection days remain higher than creditors' payment days in the panel data, indicating that trade debt issuance is more common than trade credit demand from creditors. The negative value of *ASL* and *LiqZero* is reverse to the illiquidity described in the variable measurement. The higher value represents the highest liquidity. The descriptive statistics of all control variables are consistent with those in previous studies (Cai et al., 2014; Cull et al., 2009; Shahzad et al., 2021a). The study applied the Pearson correlation analysis and the panel data has no problem with multicollinearity. The correlation score among variables was not causing multicollinearity issues. The result is not reported in the interest of brevity.

Table 3. Descriptive statistics

| Variable | N | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| *CCD* | 14,666 | 78.661 | 51.126 | 0.9627 | 156.92 |
| *SPD* | 14,666 | 63.268 | 41.634 | 4.9651 | 193.67 |
| *ASL* | 14,666 | –0.0023 | 0.0015 | –0.0164 | –0.0003 |
| *LiqZero* | 14,666 | –0.0249 | 0.0210 | –0.2395 | –0.0018 |
| Firm Size | 14,666 | 21.805 | 1.2168 | 19.557 | 25.663 |
| Market to Book Ratio | 14,666 | 0.5326 | 0.2532 | 0.0096 | 1.6601 |
| Assets growth | 14,666 | 0.2950 | 4.3447 | –0.9280 | 3.170 |
| *ROA* | 14,666 | 0.0370 | 0.0552 | –0.1896 | 0.1911 |
| Debt ratio (DBR) | 14,666 | 0.1798 | 0.1441 | 0 | 0.5955 |
| Cash Ratio | 14,666 | 0.1662 | 0.1317 | 0.0046 | 0.6471 |
| R&D Intensity | 14,666 | 0.0128 | 0.0173 | 0 | 0.0836 |
| *AT* | 14,666 | 0.2558 | 0.1665 | 0.0106 | 0.7311 |
| Firm age | 14,666 | 13.327 | 5.6127 | 1 | 41 |
| Market Share | 14,666 | 0.0018 | 0.0016 | 0.0001 | 0.0114 |

### 3.2. Trade credit policies and stock liquidity

Table 4 presents the regression estimates. The control variables are statistically significant, and the estimates consistent with previous studies reporting in Table 2. Column 01 carries the regression outcomes on the association between trade credit supply and stock liquidity. The coefficient value of *ASL* is significantly positive. The estimates receive strong support to validate H1, the findings are robust with the alternative proxy of stock liquidity *LiqZero* in column 03, and the forecast remains consistent. Column 02 shows the nexus of trade credit demand and stock liquidity. The coefficient value is significantly negative, producing statistical support to H2 that stock liquidity allows the firm to rely less on trade credit demand. The findings remain consistent with an alternative proxy of stock liquidity *LiqZero* in column 04. These estimates are consistent with financing theories in several ways. First, enterprises intend to utilize trade-credit provisions due to the competitive advantage on traditional financing (Financial advantage theory of trade credits; Schwartz, 1974). The positive nexus between stock liquidity and provisions to sundry debtors allow firms to avail the advantage of information acquisition, and minimum trade credit demand can protect firms from the suppliers' control and salvaging value from existing assets. Second, the buyers' opportunism expression of financial distress theory (Gordon, 1971) supports these estimates. For instance, if suppliers are in financial distress, prompt payment to creditors and high provisions to debtors can further alleviate the crisis. Therefore, the empirical significance of the linkage between stock liquidity and trade-credit strategies is crucial in this setting. Third, the estimates are consistent with the price discrimination theory (Narasimhan, 1984) that enterprises resort to non-price competition in the presence of a competitive environment. Therefore, stock liquidity allows firms to produce high trade credit provisions in favor of their customers.

Table 4. Baseline regression

| Variables | *CCD* | *SPD* | *CCD* | *SPD* |
|---|---|---|---|---|
| | (01) | (02) | (03) | (04) |
| *ASL* | 72.545[c] | –53.073[a] | | |
| | (28.01) | (20.769) | | |
| *LiqZero* | | | 38.388[b] | –42.820[b] |
| | | | (16.586) | (16.757) |
| *SPD* | 0.142[a] | | 0.142[a] | |
| | (0.010) | | (0.010) | |
| *CCD* | | 0.163[a] | | 0.164[a] |
| | | (0.010) | | (0.010) |
| *Size* | 3.459[a] | 3.664 | 3.409[a] | 3.557 |
| | (0.751) | (0.752) | (0.750) | (0.752) |
| *MBR* | 14.766[a] | –1.135 | 15.120[a] | –0.869 |
| | (2.211) | (2.237) | (2.218) | (0.246) |
| *Growth* | –0.144[a] | –0.022 | –0.143[a] | –0.024 |
| | (0.055) | (0.055) | (0.055) | (0.055) |

*End of Table 4*

| Variables | *CCD* | *SPD* | *CCD* | *SPD* |
|---|---|---|---|---|
| | (01) | (02) | (03) | (04) |
| *ROA* | –42.237[a] | –28.560[a] | –40.479[a] | –32.122[a] |
| | (6.602) | (6.707) | (6.512) | (6.621) |
| *Lev* | 18.517[a] | –8.389[a] | 18.539[a] | –8.258[a] |
| | (3.089) | (3.123) | (3.088) | (3.124) |
| Cash ratio | –12.758[a] | –7.258[b] | –12.500[a] | –7.852[b] |
| | (3.082) | (3.119) | (3.074) | (3.113) |
| R&D intensity | 90.632[a] | –31.897 | 80.471[a] | –31.680 |
| | (25.275) | (25.574) | (25.272) | (25.580) |
| Tang | –34.622[a] | –19.242[a] | –34.494[a] | –19.279[a] |
| | (3.105) | (3.174) | (3.106) | (3.175) |
| Market Share | –36.148[a] | 86.417[a] | –35.617[a] | 84.828[a] |
| | (5.853) | (5.907) | (5.816) | (5.876) |
| AGE | –2.951[a] | 1.510[a] | –2.967[a] | 1.558[a] |
| | (0.144) | (0.148) | (0.143) | (0.147) |
| Constant | 45.961[a] | –38.588[b] | 47.370[a] | –36.496[b] |
| | (15.899) | (15.934) | (15.890) | (15.935) |
| Year and industry effect | Included | Included | Included | Included |
| N | 11,733 | 11,733 | 11,733 | 11,733 |
| $R^2$ | 0.242 | 0.133 | 0.243 | 0.133 |

*Note*: The parentheses report the standard error. The significance level is reported as a = $p < 0.01$, b = $p < 0.05$, c = $p < 0.1$.

### 3.3. Chinese corporate setting and the nexus of stock liquidity and trade-credit policies

The unique institutional setting of Chinese firms may challenge the explanatory power of H1 and H2. Therefore, the study splits the sample as per institutional setting, i.e., state ownership and private enterprises. The difference between these two groups evaluated by applying the SUEST analysis. The empirical findings are reported in Table 5. The coefficient of ASL in SOEs (95.742 > 25.534) and the coefficient value of inter-group SUEST analysis is 4.70, statistically significant. It indicates that the nexus of stock liquidity and debtors' collection tenure is significantly diverse in SOEs and private firms. The estimates of Panel B are consistent with these predictions. It is essential to highlight the theoretical support for these predictions. First, the transaction cost theory of firms (Williamson, 1985) argues that Public firms are more efficient at solving transaction cost problems than market transactions. Second, the resource-based theory of the firm (Barney, 1996) emphasizes the positive role of public ownership that SOEs are more efficient on the collection of various resources and capabilities. These are the possible theoretical justifications to approve that stock liquidity exerts

significant motivation in SOEs to mobilize capital through trade credit policies compared to private firms. The meaningful learning is that SOEs whose stock liquidity is high keep the potential to mobilize capital through trade-credit policies in the overall economic setting.

Table 5. Chinese institutional setting

| Panel A: Trade credit supply *(CCD)* | | | | | | |
|---|---|---|---|---|---|---|
| Variables | Amihud Stock Liquidity *(ASL)* | | | Zero Return Liquidity *(LiqZero)* | | |
| | State-Owned Enterprises | Private Firms | Seemingly unrelated estimations (SUEST) Analysis | State-Owned Enterprises | Private Firms | Seemingly unrelated estimations (SUEST) Analysis |
| | (01) | (02) | (03) | (04) | (05) | (06) |
| Stock Liquidity | 95.742[a] | 23.534[a] | 4.70 | 134.18[a] | 68.835 | 5.41 |
| | (63.105) | (12.931) | Prob>chi = 0.030 | (41.474) | (25.504) | Prob>chi = 0.020 |
| Control Effect | Yes | Yes | | Yes | Yes | |
| Time & Ind. Effect | Yes | Yes | | Yes | Yes | |
| Constant | 47.719[a] | 29.610[a] | | 267.626[a] | 326.041[a] | |
| | (20.708) | (14.203) | | (20.662) | (14.086) | |
| N | 6423 | 5310 | | 6423 | 5310 | |
| $R^2$ | 0.339 | 0.496 | | 0.338 | 0.496 | |
| Panel B: Trade credit demand (*SPD)* | | | | | | |
| Stock Liquidity | –21.655[a] | –18.968 | 10.83 | –19.140[c] | –17.543[b] | 12.00 |
| | (14.766) | (10.777) | Prob>chi = 0.001 | (16.292) | (12.673) | Prob>chi = 0.005 |
| Control variables | Included | Included | | Included | Included | |
| Year and industry effect | Included | Included | | Included | Included | |
| Constant | –70.265[a] | –53.997[a] | | –65.463[a] | –153.24[a] | |
| | (18.321) | (13.377) | | (18.256) | (13.266) | |
| N | 6423 | 5310 | | 6423 | 5310 | |
| $R^2$ | 0.277 | 0.347 | | 0.276 | 0.374 | |

*Note*: The parentheses report the standard error. The significance level is reported as a = $p < 0.01$, b = $p < 0.05$, c = $p < 0.1$.

### 3.4. Endogeneity

Stock liquidity could be driven by exogenous forces, resulting in a high correlation with the error term. Many factors and economic policies, e.g., split share structure reforms in China, pose an exogenous impact on enterprise stock liquidity (Shahzad et al., 2021a). These economic decisions may intervene and challenge the main conclusion on the linkage between

stock liquidity and trade credit policies. SSSR was implemented from 2005–2007 to allow firms to raise non-tradable shares in the capital market. Many studies approve the impact of these policies on the efficiency of the Chinese stock market (Li & Zhang, 2011; Shahzad et al., 2021d). Therefore, SSSR is the best fit to evaluate the causal impact and to control the endogeneity due to the following reasons. First, SSSR was initiated for a very different reason to affect trade-credit strategies. More important, all enterprises were mandatory to adopt SSSR by the Chinese Security Regulatory Commission within a given time frame. Therefore, enterprises can choose whether and when to implement SSSR. Second, SSSR offers a practical quasi-natural experiment setting for evaluating the effect of stock liquidity on trade-credit policies to solve the reverse causality issues. Many studies identify the exogenous shocks of SSSR as quasi-natural experiments that influence the stock liquidity (Gu et al., 2018; Qiao & Pukthuanthong, 2019; Shahzad et al., 2021a). The sample is sorted on both before and after SSSR into tertile based on the change in stock liquidity. The highest tertile is assumed as a more remarkable improvement in stock liquidity. Next, the probit regression is applied to estimate the propensity score of the top group where independent variables are the same control variables used in baseline regression. The treatment group is compared with the closest propensity score of the control group; if the control firm is matched with treatment firms, the pair is retained for which the propensity score is most relative. This setting provides 298 unique firms. Next, two dummy variables are created to conduct DID analysis. The SSSR dummy is equal to 01 for the year above 2006 and 0 otherwise. The Treat dummy is created for the treatment firms; both dichotomous variables are interacted, which is the variable of the primary interest. SSR and treat group (SSR×Treat) interaction evaluates the exogenous impact of SSSR on the treatment group compared to the control firms. Table 6 carries the results. The coefficients of the interaction term (SSSR×Treat) remain consistent with the baseline estimates. It validates that the treated firm experiences substantial improvement in stock liquidity, allowing this group to increase the supply and usage of trade credits; therefore, the said nexus is causal.

Table 6. Endogeneity

| Panel A: Univariate Analysis | | | | |
|---|---|---|---|---|
| *ASL* | Before | After | Difference | t-test |
| Split Share Structure Reforms 2006 | –0.003081 | –0.002146 | –0.000934 | 30.157[a] |
| Panel B: Difference-in-Difference (DID) estimation | | | | |
| VARIABLES | CCD | SPD | | |
| | (01) | (02) | | |
| *Treat* | –14.258[a] | 0.893 | | |
| | (2.331) | (1.394) | | |
| *SSR* | –27.103 | 13.138 | | |
| | (20.630) | (23.934) | | |
| *Treat* × *SSR* | 16.262[a] | –4.664[a] | | |
| | (2.438) | (1.457) | | |

*End of Table 6*

| Panel B: Difference-in-Difference (DID) estimation | | | | |
|---|---|---|---|---|
| *ASL* | Before | After | Difference | t-test |
| Year and industry effect | Included | Included | | |
| Control Variables | Included | Included | | |
| Constant | 41.558[b] | –29.381 | | |
| | (19.574) | (22.292) | | |
| N | 3,862 | 3,862 | | |
| $R^2$ | 0.247 | 0.132 | | |
| Treatment and control effects | | | | |
| | Treatment | Control | Effect | |
| *CCD* | 24.3004 | 8.0384 | 16.262 | |
| *SPD* | 8.28132 | 12.9453 | –4.6641 | |
| | | | | |

*Note*: The parentheses report the standard error. The significance level is reported as a = $p < 0.01$, b = $p < 0.05$, c = $p < 0.1$.

## 3.5. Additional analysis

### 3.5.1. Corporate financial limitations

Firms' capacity to make financial adjustments in debt constrained environment is known as financial flexibility. The greater flexibility shape a fertile platform for equity raising, and it also alleviates debt constraints. Managers tend to design conservative leverage policies to secure their position (Graham & Harvey, 2001). In this context, trade credit policies play a crucial role in maintaining financial flexibility through sizeable cash holdings (Howorth & Reber, 2003). Many studies unfold the significant nexus of enterprise financial flexibility and informal financing (Bastos & Pindado, 2013; McGuinness et al., 2018). Therefore, the association between stock liquidity and trade credit policies should be crucial topic for debt-constrained enterprises. The study applied Whited & Wu's (2006) index to evaluate the reliability of H1 and H2 in financially constrained firms. Eq. (3) carries the detail.

$$WWI = -0.091 \times CashFlow - 0.062 \times DivDum + 0.021 \times LTDR - 0.044 \times FS + 0.102 \times IG - 0.035 \times SG. \quad (3)$$

Cash flow is equal to cash inflow from operation divided by total assets; *DivDum* represents dividend dummy which is equal to 01 if dividend is paid and 0 otherwise. The term *LTDR* is equal to interest bearing long-term debt scaled by total assets; *FS* represents firm's size; *SG* is used for industry growth; and *IG* denotes industry growth. The SA Index of Hadlock & Pierce (2010) is applied for robustness. Eq. (4) carries the detail.

$$\text{SA Index} = -0.737 \times FS + 0.043 \times FS^2 - 0.040 \times Age. \quad (4)$$

The panel data is divided into the quartile based on Eq. ((3)) and (4), and dichotomous variables are created for debt constrained enterprises, which are denoted as WWD and SAD, the observations in the highest quartile are coded as 01 and 0 otherwise. The variable of the primary interest is the interaction term, and it expects that the coefficient values remain consistent with the baseline estimations. Table 7 reports the results. The coefficient values of the primary interest variables (ASL×WWD and ASL×SAD) remain consistent with the baseline predictions. It validates that the predictions of H1 and H2 are highly visible in financially constrained firms. All estimates were robust with an alternative proxy of LiqZero that remained consistent, and those findings were not reported in the interest of brevity.

Table 7. Financial flexibility (debt constraints)

| Variables | WW INDEX | | SA INDEX | |
|---|---|---|---|---|
| | *CCD* | *SPD* | *CCD* | *SPD* |
| | (01) | (02) | (03) | (04) |
| *ASL* | 52.855[a] | –62.145[c] | 35.145 | 68.182 |
| | (22.321) | (26.233) | (25.189) | (56.158) |
| *WWD* | 26.511[a] | 57.006[a] | | |
| | (16.795) | (17.119) | | |
| *ASL×WWD* | 72.765[a] | –39.294[c] | | |
| | (36.306) | (30.702) | | |
| *SAD* | | | 11.743[b] | 14.486[b] |
| | | | (5.852) | (5.902) |
| *ASL×SAD* | | | 24.754[c] | –44.025[a] |
| | | | –14.281 | (16.657) |
| Control variables | Included | Included | Included | Included |
| Year and industry effect | Included | Included | Included | Included |
| Constant | –2.553 | –27.494 | 268.434[b] | 277.091[b] |
| | (17.782) | (17.889) | (117.719) | (118.795) |
| N | 11,733 | 11,733 | 11,733 | 11,733 |
| $R^2$ | 0.235 | 0.135 | 0.243 | 0.135 |

*Note*: The parentheses report the standard error. The significance level is reported as a = $p < 0.01$, b = $p < 0.05$, c = $p < 0.1$.

### 3.5.2. External finance dependency

If firms are more reliant on equity financing, the predictions of H1 and H2 should be robust in those highly dependent upon equity financing. The study followed Petersen and Rajan (1997) to evaluate enterprises' finance dependence and equity dependence. The finance dependency is measure by capital expenditures in the current year minus cash flow from operating activities divided by the amount paid for capital expenditures. Equity dependency is measured by the amount received from the equity issues minus the amount paid to buy common and preferred stock divided by the amount paid for capital expenditures; total

assets scaled all variables. These proxies were interacted with stock liquidity to evaluate the explanatory power of baseline predictions for those highly reliant on equity financing. The results are reported in Table *8*, which are consistent with the baseline prediction. It validates that the predictions of H1 and H2 are robust where firms are highly reliant on the capital market. Extant literature documents that weak institutional settings in emerging economies transmit hazards to debt financing (Shahzad et al., 2020); thus, the role of the stock market is invaluable in this context. These estimates offer essential learning outcomes that the business transactions associated with equity financing. In this setting, stock liquidity can mobilize capital in the overall economic environment through trade credit provisions.

Table 8. Financial flexibility (equity reliance)

| Variables | External finance dependence | | Equity dependence | |
|---|---|---|---|---|
| | *CCD* | *SPD* | *CCD* | *SPD* |
| | (01) | (02) | (03) | (04) |
| *ASL* | 68.290[b] | –44.071[a] | 26.899 | –63.906[a] |
| | (20.538) | (28.784) | (17.088) | (38.841) |
| *FDEP* | 0.383[c] | 0.171[a] | | |
| | (0.081) | (0.042) | | |
| *ASL* × *FDEP* | 47.466[a] | –49.954[a] | | |
| | (21.593) | (12.141) | | |
| *EQDEP* | | | 0.937[a] | 0.376[a] |
| | | | (0.241) | (0.139) |
| *ASL* × *EDEP* | | | 74.395[a] | –76.754[c] |
| | | | (78.007) | (43.986) |
| Control variables | Included | Included | Included | Included |
| Year and industry effect | Included | Included | Included | Included |
| Constant | 44.501[a] | –31.107[c] | 70.023[a] | –0.783 |
| | (15.914) | (15.976) | (18.173) | (22.753) |
| N | 11,728 | 11,711 | 8,370 | 8,370 |
| $R^2$ | 0.245 | 0.137 | 0.164 | 0.129 |

*Note*: The parentheses report the standard error. The significance level is reported as a = $p < 0.01$, b = $p < 0.05$, c = $p < 0.1$.

## Conclusions

The study investigates the nexus between stock liquidity and trade credit policies. The findings approved that stock liquidity significantly impacts trade credit provision for debtors and minimizes trade credit demand. The said association is more visible in SOEs, financially constrained, and those corporations whose financial structure is highly reliant on equity financing. The findings are consistent with the previous expression that enterprise debt strength

motivates firms to redistribute capital through trade credit policies. The study introduced the role of the capital market through the nexus of stock liquidity and trade credit provisions. Consistent with the resource-based theory of firms, the main conclusion highlights that the role of SOEs is crucial to mobilize capital in the overall economy. The findings produce essential learning to the literature that investigates the trade credit strategies of large and public corporations that equity trading of these firms has significant potential to redistribute capital through informal banking.

The study offers significant policy implications. Stock market liquidity has a great attachment with economic growth, and trade credits enhance enterprise purchasing power. The affiliation between stock liquidity and trade credit provisions mobilize capital from the stock market to those economic sectors which are constrained to participate in the stock exchanges. The said affiliation is significant for emerging economies where financial opportunities are not equal due to weak governance settings. On a micro level, managers and board of directors are suggested to focus on stock liquidity. Therefore, they can avoid excessive debt utilization, and this practice can secure financial flexibility that ultimately promotes investment efficiency. Besides, stock liquidity can allow managers to shape a non-price competitive strategy through trade credit provisions for their customers against those whose equity is illiquid. The study has the following limitations. First, the analyses were applied in China, where large enterprises mostly operate under government ownership. These firms receive motivation from political agendas, i.e., employment issues and social development, and government bureaucrats regulate their policies. Many SOEs operate government-sponsored projects which undermine shareholder value and stock liquidity. Therefore, the nexus of stock liquidity and trade credit policies may produce different results in this setting. This study did not cover this aspect because CSMAR does not contain any data on government-sponsored projects. Second, stock liquidity is not the only factor that can drive investors' sentiments in the stock exchange. Dividend payout, earning management, governance quality is other significant drivers to investment choices. The study recommends exploring these critical factors to identify the role of the stock market on informal capital mobilization, i.e., trade credits.

## Acknowledgements

All authors would like to express their deep and sincere gratitude to Managing Editor Dr Ramonda Martinkute-Kauliene, for allowing us to receive the invaluable reviews. We would acknowledge Dr. Tingyun Pang, School of Accounting, Shanghai University of Finance and Economics, Shanghai, P. R. China for her assistance in the data collection of SSSR reforms and the application of the difference-in-difference approach in this study.

## Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sector.

## Author contributions

Umeair Shahzad and Jing Liu concived the study and were responsible for the design and development of the data analysis. Prof. Dr. Fukai Luo supervised the study.

## Disclosure statement

Authors bear no conflict of interest in any part of paper including designing, results, interpretations, and policy implications. No third party is involved in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

## Data availability statement

The data support the findings of this study are openly available in CSMAR at http://www.gtadata.com

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