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Asset Liquidity and Trade Credit: International Evidence

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We examine the association between asset liquidity and trade credit. We expect that firms having more asset liquidity prefer to use less trade credit. Using international data of 69 countries, we find that firms having more asset liquidity prefer to use less trade credit. Our results are robust to a wide variety of fixed effects, using change regression, propensity score matching, excluding outliers, and using alternative measures of trade credit and asset liquidity.

Keywords: Asset liquidity; Trade credit; Sources of finance; Cost of capital; Cost of debt.

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I. Introduction

Firms having low-cost alternative sources of financing, for the most part, do not use costly trade credit finance (Coleman 2005). Access to alternative sources of financing depends on different factors such as better accounting quality (Li et al. 2021; Chen et al. 2017), firm size and credit rating (Colla, Ippolito, and Li 2013), internal control weaknesses (Li et al. 2014), or collateral (González, Lopez, and Saurina 2007; Safavian 2008). The liquidity of firms' assets, an unexplored factor associated with trade credit, may be a reason for firms to have better access to alternative sources of financing (Morellec 2001; Sibilkov 2009). To the extent that asset liquidity is related to low-cost alternative sources of funds, a firm's use of trade credit depends on the degree of the liquidity of the firm's assets.

Trade credit is the single most important source of short-term external financing in the United States (Petersen and Rajan 1997). After bank financing, it is the next most important source of short-term financing in a broad range of industries and economies (Fishman 2001). The use of trade credit as an alternative source of financing is also globally popular. For example, in an international setting, Levine, Lin, and Xie (2018) document that trade credit accounts for 25% of the average firm's total debt liabilities in their sample of more than 3,500 firms across 34 countries for the period of 1990 to 2011, and Williams (2008) reports that almost 90% of global merchandise is purchased on trade credit. Given the prevalence of trade credit and its importance on business financing, both theoretical (Emery 1984; Petersen and Rajan 1997) and empirical (Klapper, Laeven, and Rajan 2012; Love and Zaidi 2010; Molina and Preve 2012; Petersen and Rajan 1997) studies have investigated the determinants of the use of trade credit by firms. No study has yet investigated the impact of the liquidity of assets on trade credit. This is the first study to investigate the relation between trade credit and asset liquidity.

Existing research suggests how asset liquidity could affect corporate securities and a firm's financing decisions. For example, Morellec (2001) shows that greater asset liquidity reduces credit spreads on corporate debt and increases optimal leverage. Firms having more liquid assets enjoy operating flexibility, and Ortiz-Molina and Phillips (2014) find that higher asset liquidity is negatively associated with cost of capital. Higher liquidity allows firms to have better access to alternative sources of financing (Lipson and Mortal 2009; Shang 2020), and these firms choose banks and capital markets as their primary source of external financing (Gatev, Schuermann, and Strahan 2009; Ortiz-Molina and Phillips 2014). Related studies (e.g., Smith (1987) and Petersen and Rajan (1994)) find that firms first use inexpensive bank loans and then expensive trade credit after bank loans become unavailable (Smith 1987; Petersen and Rajan 1994). Firms having illiquid assets are more likely to use long-term debt because less liquid assets sell at higher costs, increasing the cost of liquidation, bankruptcy, and debt. Therefore, we predict that firms having more asset liquidity are less likely to use trade credit.

To examine the impact of asset liquidity on a firm's use of trade credit, we use a weighted asset liquidity score using the book value of the different assets as weights and normalize by lagged value of total assets. We test our hypothesis using 90,119 firm-year observations of 69 countries for the period of 2010 to 2020. The empirical results are consistent with our hypothesis that firms having more asset liquidity are less likely to use costly trade credit. Our results hold after controlling for firm- and country-level variables.

Potential concerns in our analysis are the endogeneity, omitted variable bias, and impact of outliers. We address these concerns using change regressions, propensity score matching, excluding outliers, using firm and year fixed effects in the estimation, and employing alternative measures of trade credit and asset liquidity. In all the tests, we find robust results in support of our hypothesis that firms having higher asset liquidity are less likely to use trade credit.

This paper contributes to the literature in several ways. First, this is the first study to investigate the association between asset liquidity and trade credit. This investigation is important because it shows how the liquidity of assets affects a firm's decision to use external financing. Second, this article contributes to the growing literature of asset liquidity. Recent studies show that asset liquidity is associated with a firm's choice of debt, cost of capital, and cost of debt. No study has yet investigated the impact of asset liquidity on a firm's use of trade credit. We contribute to this growing literature by showing that firms having higher asset liquidity are less likely to use trade credit. Third, this study contributes an interesting perspective to the growing body of literature of a firm's debt choices. Studies (e.g., Gwatidzo and Ojah (2014) and Boubaker, Saffar, and Sassi (2018)) find that a firm's debt choice is affected by product market competition and institutional infrastructure. However, no study has yet investigated the impact of asset liquidity on trade credit in an international setting. International investors would benefit from the findings of this study.

The reminder of the paper is organized as follows: Section 2 discusses the literature and develops the hypothesis; and Section 3 discusses the data and variables. In Section 4, we develop our econometric model. Section 5 presents the empirical findings; and finally, Section 6 summarizes and concludes.

II. Literature review and hypothesis

An extensive body of research examines numerous determinants of a firm's use of trade credit (e.g., Ferris (1981); Smith (1987); Long, Malitz, and Ravid (1993); Petersen and Rajan (1997); Delannay and Weill (2004); Chen et al. (2017); Islam (2018); Hasan and Habib (2019); and Islam and Wheatley (2021)). In this study, we investigate the impact of asset liquidity on the firm's use of trade credit. We predict that firms having higher asset liquidity have better access to alternative sources of external financing and are less likely to use costly trade credit.

In this study, we broadly define asset liquidity and trade credit. Following existing literature (e.g., Petersen and Rajan (1997); Chen et al. (2017); and Hasan and Habib (2019)), we use the term trade credit to refer to the firm's accounts payable as shown on the balance sheet. We utilize the measure of asset liquidity from prior studies (Gopalan, Kadan, and Pevzner 2012; Charoenwong, Chong, and Yang 2014). While defining asset liquidity of a firm, we assign a liquidity score between zero and one to all assets on its balance sheet based on their level of liquidity (Gopalan, Kadan, and Pevzner 2012). We then calculate a weighted asset liquidity score using the book value of the different assets as weights and normalize by the lagged value of total assets. Using this approach, we come up with three alternative measures of asset liquidity. Finally, we create a combined liquidity score by adding them all and dividing by three.

Prior studies use this measure to examine the impact of asset liquidity on stock liquidity (Gopalan, Kadan, and Pevzner 2012), cost of capital (Ortiz-Molina and Phillips 2014), and firm innovation (Pham et al. 2018). However, no study has yet examined the impact of asset liquidity on a firm's use of trade credit. In a concurrent study, Ortiz-Molina and Phillips (2014) find that firms with more illiquid assets have a higher cost of capital. They also find that firms having higher asset illiquidity and less access to external capital experience more cost of capital. Gopalan, Kadan, and Pevzner (2012) find that asset liquidity improves stock liquidity, and Marks and Shang (2021) document that firms with liquid stock tend to issue longer-term bonds and enjoy lower bond yield spreads. Cheung, Im, and Zhang (2018) find that stock liquidity increases a firm's propensity to raise debt capital rather than equity capital. Using a sample of U.S. public companies, Sibilkov (2009) finds that leverage is positively associated with liquidity and the relation is also positive with secured debt. In contrast to these studies, our study focuses on the more short-term debt, trade credit, proxied by accounts payable.

When firms have more asset liquidity, traditional financing sources become more available to them at a lower cost (Ortiz-Molina and Phillips 2014; Marks and Shang 2021) and they try not to use the costly (Chen, Ma, and Wu 2019)[1] trade credit. In this context, firms are more likely to use other external sources of financing. Related studies (e.g., Schwartz (1974) and Petersen and Rajan (1997)) suggest that firms having better access to financial credit extend more credit to financially constrained firms and firms that having limited access to capital markets demand more trade credit. While firms' use of trade credit is considered as a single major source of external financing (Petersen and Rajan 1997), the literature on trade credit remains silent on whether the liquidity of assets may have an impact on the firm's decision to use more or less trade credit. To the extent that asset liquidity is related to low-cost alternative sources of funds, a firm's use of trade credit depends on the degree of the liquidity of a firm's assets. Collectively, these arguments suggest that firms having more asset liquidity have better access to low cost external sources of financing and are less likely to use costly trade credit. This idea leads us to our hypothesis:

H: Firms with higher asset liquidity are less likely to use trade credit.

There are a number of reasons why we might not find our hypothesized relation. First, in the case of firms suffering from financial constraints, we might not observe the significant negative association between asset liquidity and a firm's use of trade credit because a financially distressed firm's traditional financing becomes more costly and/or less accessible. In this situation, firms cannot choose from alternative sources of financing and are willing to use costly financing sources such as trade credit. From our above arguments, we expect that financially distressed firms may be using more trade credit even after having more liquid assets. Second, firms with consecutive losses also have less access to alternative sources of external financing at a lower cost. In this situation, firms with consecutive losses may also be using more trade credit than firms with consecutive profits. For these reasons, we believe that it is not ex ante certain that asset liquidity will necessarily be negatively associated with a firm's use of trade credit, and for this reason, it is an empirical question.

III. The data and variables

Our sample consists of 90,119 firm-year observations of 16,593 unique firms from 69 countries, which include developed and developing countries, and covers the period of 2010 to 2018. We start our sample from 2010 because all variables from Compustat Global are available from the year 2010. We obtain the financial data from the Compustat Global and Compustat North America databases and country-level data from several sources (see Appendix A for details). In our analysis, we keep all industry data so that we can investigate a clean association between our variables of interest. From the sample over the period of 2010 to 2018, firms located in Israel (0.46), Jamaica

[1] Chen, Ma, and Wu (2019) report that the annual interest rate involved with trade credit may be more than 40%.

(0.47), Bermuda (0.44), China (0.43), and Japan (0.43) maintain the highest asset liquidity, whereas firms in Tunisia, Turkey, Portugal, Kazakhstan, Lithuania, Italy, Canada, Argentina, India, and the Czech Republic use more trade credit. China (6.46%), Bangladesh (5.63%), Viet Nam (5.38%), Lithuania (5.08%), the Philippines (4.59%), and Turkey (4.54%) ranked the highest in terms of GDP growth, and Bangladesh (1196), Bermuda (1202), Malta (1380), the Netherlands (500), and Singapore (7662) have the highest population density.

Following prior studies (Petersen and Rajan 1997; Chen et al. 2017; Hasan and Habib 2019), we define trade credit, our dependent variable, as the ratio of accounts payable to total assets (*AP/AT*). As alternative measures, we calculate trade credit as accounts payable (*AP*) and notes payable (*NP*) scaled by total assets, and the sum of accounts payable, notes payable, and debt in current liabilities scaled by total assets [*(AP+NP+DLC)/AP*].

The variable of interest, our independent variable, is asset liquidity. Following prior studies (Gopalan, Kadan, and Pevzner 2012; Charoenwong, Chong, and Yang 2014), we define asset liquidity using the book value of the different assets as weights and normalized by the lagged value of total assets. We calculate three alternative measures of asset liquidity and finally create a composite score by adding them together and dividing by three.

Our first measure assigns a liquidity score of one to cash and cash equivalents and a score of zero to all other assets of the firms as follows:

$$\mathrm{WAL1}_{\mathrm{i.t}}=\frac{\text{Cash \& Equivalent}_{\mathrm{i.t}}}{\text{Total Assets}_{\mathrm{i,t\text{-}1}}}\times 1+\frac{\text{Other Assets}_{\mathrm{i,t}}}{\text{Total Assets}_{\mathrm{i,t-1}}}\times 0$$

Clearly, this measure suffers from limitations as it assumes that all assets other than cash and cash equivalents are perfectly illiquid. However, this measure is useful to best capture the impact of liquidity on trade credit.

As non-cash current assets (CA), semi-liquid assets, can be converted into cash relatively quickly and at a low cost, we assign a liquidity score of one-half to them. Our second measure of asset liquidity is:

$$\mathrm{WAL2}_{\mathrm{i,t}}=\frac{\text{Cash \& Equivalent}_{\mathrm{i,t}}}{\text{Total Assets}_{\mathrm{i,t-1}}}\times 1+\frac{\text{Non Cash CA}_{\mathrm{i,t}}}{\text{Total Assets}_{\mathrm{i,t-1}}}\times 0.5+\frac{\text{Other Assets}_{\mathrm{i,t}}}{\text{Total Assets}_{\mathrm{i,t-1}}}\times 0$$

By dividing non-current assets into two parts—tangible and intangible, we assign a liquidity score of one for cash, three-quarters for non-cash current assets, one-half for tangible assets, and zero for the rest. This gives the third measure of liquidity as follows:

$$\begin{aligned}\mathrm{WAL}_3=&\frac{\text{Cash \& Equivalent}_{\mathrm{I,t}}}{\text{Total Assets}_{\mathrm{I,t\text{-}1}}}\times 1+\frac{\text{Non Cash CA}_{\mathrm{I,t}}}{\text{Total Assets}_{\mathrm{I,t\text{-}1}}}\times 0.75\\&+\frac{\text{Tangible Fixed Assets}_{\mathrm{i,t}}}{\text{Total Assets}_{\mathrm{i,t\text{-}1}}}\times 0.5+\frac{\text{Other Assets}_{\mathrm{i,t}}}{\text{Total Assets}_{\mathrm{i,t\text{-}1}}}\times 0\end{aligned}$$

Finally, we construct a composite measure of asset liquidity to best capture the influence of all the measures on our parameter, β_1.

As suggested by prior studies (Petersen and Rajan 1997; Chen et al. 2017; Hasan and Habib 2019), we use a battery of control variables in our regression analysis. We control for firm size (*SIZE*), level of firm leverage (*LEVERAGE*), research and development expenditure (*R&D*),

market share (*MKTSHARE*), firm maturity (*REPE*), capital intensity (*CAPINT*), level of raw materials (*LIQUIDCOST*), intangible assets (*INTANG*), current liabilities excluding accounts payable (*CLXTRADE*), recoverable slack (*RECSLACK*), and potential slack (*POTSLACK*). We also control for country-level variables such as gross domestic product growth rate (*GDPGRR*) and population density (*POPDEN*). In addition, we control for industry, year, and country dummies. Variable definitions are provided in Appendix A.

IV. The econometric model

To examine the relation between asset liquidity and trade credit, we estimate the following multivariate regression model:

$$TC_{i,t}=\alpha_0+\beta_1 COMPLIQ_{i,t}+\sum_{j=2}^{14}\beta_{i,t}\,CONTORLS+Ind_j+Yr_t+C_c+\varepsilon_{i,t} \qquad (1)$$

where $TC_{i,t}$ is *TRADE CREDIT* of firm *i* in year *t*. $COMPLIQ_{i,t}$ is the composite measure of asset liquidity. We use unbalanced panel data with industry (Ind_j), year (Yr_t), and country (C_c) fixed effects to control for unobservable heterogeneity and omitted factors related to both *TRADE CREDIT* and *COMPLIQ*. Following prior studies (Jank, Roling, and Smajlbegovic 2016; Munch and Schaur 2018; Kinzius, Sandkamp, and Yalcin 2019), we use the estimator developed by Correia (2016) to deal with international data with different levels of fixed effects in a computationally efficient way.[2] We also control for variables suggested by prior studies as discussed in Section 3. All continuous variables are winsorized at the 1st and 99th percentile.

V. Results

In Table 1, we present the descriptive statistics of the variables used in our model. The mean (median) of asset liquidity (*COMPLIQ*) is 0.40 (0.38) in our sample. The mean and median of trade credit (*TC1*) are 0.11 and 0.09, respectively. The mean and median of *TC2 (TC3)* are 0.17 (0.26) and 0.14(0.19), respectively. The sample has a mean *SIZE* of 7.36, *LEVERAGE* of 0.10, *MKTSHARE* of 0.02, *R&D* of 0.04, *REPE* of 0.17, *LIQUIDCOST* of -0.03, *INTANG* of 0.10, *CLXTRADE* of 0.20, *RECSLACK* of 0.28, *POTSLACK* of 0.17, *GDPGRR* of 2.92, and log of *POPDEN* of 4.96. The percentage of cash holding is 5% of total assets, and capital intensity is 23% of total assets.

In Table 2, we present the correlation among the variables used in our analysis. The results show that the correlation between asset liquidity and *TRADE CREDIT* is negative (coefficient =-0.02 with *TC1*, -0.10 with *TC2*, and -0.15 with *TC3*) and significant at the 1% level. Consistent with existing studies (e.g., Molina and Preve (2012) and Chen et al. (2017)), we find that *TRADE CREDIT* is negatively associated with *LIQUIDCOST* (coefficient =-0.17), *INTANG* (coefficient = -0.21), *RECSLACK* (coefficient = -0.14), *POTSLACK* (coefficient = -0.13), and *CASHHOLD* (coefficient = -0.10). In addition, we find a positive association between *TRADE CREDIT* and *REPE*, *GDPGR, POPDEN,* and *CLXTRADE.* The results indicate that firms having higher asset liquidity are less likely to use trade credit, suggesting our hypothesis.

[2] We implement two-dimensional fixed effects using the "reghdfe" stata command by Correia (2016).

Table 1. Firm characteristics.

Variable	n	Mean	S.D.	Min	0.25	Mdn	Max
TC1	90,119	0.11	0.08	0.00	0.04	0.09	0.40
TC2	90,119	0.17	0.14	0.01	0.06	0.14	0.66
TC3	90,119	0.26	0.21	0.01	0.08	0.19	0.84
COMPLIQ	90,119	0.40	0.14	0.09	0.30	0.38	0.84
SIZE	90,119	7.36	3.09	-6.91	5.26	7.43	18.11
LEVERAGE	90,119	0.10	0.12	0.00	0.00	0.05	0.51
MKTSHARE	90,119	0.02	0.10	-0.03	0.00	0.00	1.00
R&D	90,119	0.04	0.07	0.00	0.00	0.02	0.44
REPE	90,119	0.17	1.18	-5.14	0.05	0.43	2.37
CAPINT	90,119	0.23	0.17	0.00	0.08	0.20	0.77
LIQUIDCOST	90,119	-0.03	0.03	-0.09	-0.05	-0.02	0.00
INTANG	90,119	0.10	0.12	0.00	0.01	0.04	0.45
CLXTRADE	90,119	0.20	0.13	0.02	0.10	0.17	0.57
RECSLACK	90,119	0.28	0.22	0.04	0.12	0.21	1.03
POTSLACK	90,119	0.17	0.28	0.00	0.00	0.05	2.08
GDPGRR	90,119	2.92	3.45	-31.35	1.18	2.92	23.99
POPDEN	90,119	4.96	1.16	0.51	4.44	4.99	8.98
CASHHOLD	90,119	0.05	0.09	-0.16	0.01	0.06	0.17

Table 3 provides the main results from our estimated Equation (1) using *TRADE CREDIT* as the dependent variable and *COMPLIQ* as the independent variable. We use three measures of *TRADE CREDIT* as defined in Appendix A. We find negative and significant coefficients (p-values<0.0001) for all three measures of *TRADE CREDIT*. Given the coefficient of *COMPLIQ* (-0.28), moving from the first quartile (0.30) to the third quartile (0.38) decreases the use of trade credit by 2.29%.[3] These results support our hypothesis and suggest that firms having higher asset liquidity tend to use less credit. Additionally, the coefficients of all control variables included in Equation (1) have the expected sign and are significant. For example, firm *SIZE* is significantly negatively associated with all the proxies of *TRADE CREDIT*.

Identification of main results

A major concern with our baseline estimation is the potential endogeneity. One could argue that endogeneity issues can arise when unobserved firm-specific factors affect both asset liquidity and trade credit, creating identification concerns. We address these concerns in several ways. We use change regression, propensity score matching sample, firm-fixed effects, and components of asset liquidity, and finally, we test whether our results are driven by a few industries that use the highest or lowest amount of trade credit.

[3] [0.38-0.30][exp(-0.25)-1]=2.29%

Table 2. Pearson correlation coefficients.

Panel A. Correlation variables (*TC1* to *REPE*).

		1	2	3	4	5	6	7	8	9
1	*TC1*	1.00								
2	*TC2*	0.79	1.00							
3	*TC3*	0.61	0.94	1.00						
4	*COMLIQ*	***-0.02***	***-0.10***	***-0.15***	1.00					
5	*SIZE*	0.00	0.05	0.06	-0.17	1.00				
6	*LEVERAGE*	-0.05	-0.05	0.00	-0.37	0.11	1.00			
7	*MKTSHARE*	0.00	-0.02	-0.02	-0.06	0.14	0.09	1.00		
8	*R&D*	0.03	-0.05	-0.08	0.29	-0.40	-0.02	-0.05	1.00	
9	*REPE*	0.08	0.11	0.10	-0.13	0.31	0.02	0.04	-0.28	1.00
10	*CAPINT*	-0.01	0.11	0.17	-0.34	0.31	0.22	0.05	-0.28	0.14
11	*LIQUIDCOST*	-0.17	-0.20	-0.20	0.09	-0.03	0.01	0.03	0.08	-0.07
12	*INTANG*	-0.21	-0.26	-0.25	-0.45	-0.15	0.25	0.04	0.09	-0.11
13	*CLXTRADE*	0.20	0.47	0.60	-0.05	-0.13	0.03	-0.03	0.16	0.00
14	*RECSLACK*	-0.14	-0.18	-0.18	0.27	-0.49	-0.02	-0.04	0.62	-0.35
15	*POTSLACK*	-0.13	-0.11	-0.05	-0.24	0.03	0.77	0.04	0.07	-0.02
16	*GDPGR*	0.05	0.13	0.13	0.04	0.00	-0.10	-0.06	-0.03	0.02
17	*POPDEN*	0.08	0.14	0.15	0.01	0.38	-0.08	-0.01	-0.19	0.19
18	*CASHHOLD*	-0.10	-0.14	-0.15	-0.15	0.34	0.00	0.06	-0.31	0.30

Panel B. Correlation variables (*CAPINT* to *CASHHOLD*).

		10	11	12	13	14	15	16	17	18
10	*CAPINT*	1.00								
11	*LIQUIDCOST*	-0.19	1.00							
12	*INTANG*	-0.33	0.19	1.00						
13	*CLXTRADE*	-0.04	-0.01	-0.06	1.00					
14	*RECSLACK*	-0.31	0.19	0.18	0.11	1.00				
15	*POTSLACK*	0.14	0.11	0.22	0.00	0.15	1.00			
16	*GDPGR*	0.08	-0.08	-0.07	0.03	-0.10	-0.05	1.00		
17	*POPDEN*	0.15	-0.10	-0.24	0.02	-0.24	-0.10	0.07	1.00	
18	*CASHHOLD*	0.21	-0.07	0.04	-0.15	-0.44	-0.13	0.03	0.14	1.00

Notes: All continuous variables are winsorized at the 1st and 99th percentile. Bold and italic numbers denote significance at the 1% level. Variable definitions are in Appendix A.

Tables 3. Baseline regression.

	Dependent variable = *TRADE CREDIT$_{it}$*								
	(1)				(2)			(3)		
	TC1				*TC2*			*TC3*		
	Coeff.		*p*-value		Coeff.		*p*-value		Coeff.		*p*-value
COMPLIQ	-0.125	***	0.000		-0.208	***	0.000		-0.280	***	0.000
SIZE	-0.005	***	0.000		-0.008	***	0.000		-0.010	***	0.000
LEVERAGE	0.084	***	0.000		0.048	***	0.000		0.059	***	0.000
R&D	0.014	***	0.000		0.010	**	0.025		0.005		0.360
MKTSHARE	0.195	***	0.000		0.140	***	0.000		0.032	***	0.193
REPE	0.005	***	0.000		0.006	***	0.000		0.005	***	0.000
CAPINT	-0.089	***	0.000		-0.076	***	0.000		-0.023	***	0.004
LIQUIDCOST	-0.149	***	0.000		-0.265	***	0.000		-0.397	***	0.000
INTANG	-0.168	***	0.000		-0.200	***	0.000		-0.201	***	0.000
CLXTRADE	0.083		0.000		0.465	***	0.000		0.966	***	0.000
RECSLACK	-0.063	***	0.000		-0.111	***	0.000		-0.158	***	0.000
POTSLACK	-0.042	***	0.000		-0.033	***	0.000		-0.016	***	0.002
GDPGRR	0.000		0.820		0.000		0.330		-0.001	**	0.035
PODEN	0.001	***	0.002		0.003	***	0.000		0.003	***	0.050
CASHHOLD	-0.095	***	0.000		-0.228	***	0.000		-0.369	***	0.000
Constant	0.180	***	0.000		0.218	***	0.000		0.271	***	0.000
Year FE	Yes				Yes				Yes		
Industry FE	Yes				Yes				Yes		
Country FE	Yes				Yes				Yes		
Adj. R^2	0.290				0.485				0.598		
Observations	89,980				89,970				89,970		

Notes: All continuous variables are winsorized at the 1st and 99th percentile. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively. Variable definitions are in Appendix A.

Change regression

To deal with the omitted variable bias, we regress the year-to-year change in trade credit (Δ *TRADE CREDIT)* onto year-to-year change in asset liquidity. We also include industry, year, and country dummies in our regression. We present the results of the change regression in Panel A of Table 4. The coefficient on Δ*COMPLIQ* is negative (-0.09) and significant at the 1% level (*p*-value = 0.0001). The results suggest that our baseline results are not driven by omitted variable bias.

Propensity score matching sample

To further address and mitigate the endogeneity issues, we perform additional analyses using propensity score matching (PSM). For PSM, we first sort the sample by "high liquidity" and regard those firms whose liquidity is in the highest quintile as our treatment group. Then using the propensity score estimated in the first-stage logit model, for each of the treatment firms, we find a matched control firm using the nearest neighbor propensity score matching. The matching is based

Table 4. Asset liquidity and trade credit.

Panel A. Change regression.

	Dependent variable = Δ *TRADE CREDIT*					
	(1)		(2)		(3)	
	TC1		*TC2*		*TC3*	
	Coeff.	*p*-value	Coeff.	*p*-value	Coeff.	*p*-value
ΔCOMPLIQ	-0.091***	0.000	-0.103***	0.000	-0.089***	0.000
ΔCONTROLS			Yes			
Constant	0.001***	0.000	0.001	0.660	0.009	0.596
Year Dummy	Yes		Yes		Yes	
Industry Dummy	Yes		Yes		Yes	
Country Dummy	Yes		Yes		Yes	
Adj. R^2	0.103		0.218		0.441	
Observations	70,406		70,396		70,468	

Panel B. Propensity score matching.

	Dependent variable = *TRADE CREDIT*$_{it}$					
	(1)		(2)		(3)	
	TC1		*TC2*		*TC3*	
	Coeff.	*p*-value	Coeff.	*p*-value	Coeff.	*p*-value
Treatment	-0.035***	0.000	-0.056***	0.000	-0.073***	0.000
CONTROLS	Yes		Yes		Yes	
Constant	0.168***	0.000	0.229***	0.000	0.304***	0.000
Year Dummy	Yes		Yes		Yes	
Industry Dummy	Yes		Yes		Yes	
Country Dummy	Yes		Yes		Yes	
Adj. R^2	0.304		0.347		0.525	
Observations	61,196		61,440		61,196	

Panel C. Year and firm fixed effect.

	Dependent variable = *TRADE CREDIT*$_{it}$					
	(1)		(2)		(3)	
	TC1		*TC2*		*TC3*	
	Coeff.	*p*-value	Coeff.	*p*-value	Coeff.	*p*-value
COMPLIQ	-0.021***	0.000	-0.028***	0.000	-0.030***	0.000
CONTROLS	Yes		Yes		Yes	
Constant	0.209***	0.000	0.209***	0.000	0.137***	0.000
Firm FE	Yes		Yes		Yes	
Year FE	Yes		Yes		Yes	
Industry Dummy	Yes		Yes		Yes	
Country Dummy	Yes		Yes		Yes	
Adj. R^2	0.122		0.347		0.483	
Observations	89,980		89,970		89,970	

Panel D. Alternative measures of asset liquidity (components of COMPLIQ).

	Dependent variable = *TRADE CREDIT*$_{it}$								
	(1)				(2)			(3)	
	LIQ1				*LIQ2*			*LIQ3*	
	Coeff.		*p*-value		Coeff.		*p*-value	Coeff.		*p*-value
COMPLIQ	-0.222	***	0.000		-0.123	***	0.000	-0.177	***	0.000
CONTROLS	Yes				Yes			Yes		
Constant	0.181	***	0.000		0.190	***	0.000	0.263	***	0.000
Year Dummy	Yes				Yes			Yes		
Industry Dummy	Yes				Yes			Yes		
Country Dummy	Yes				Yes			Yes		
Adj. R^2	0.498				0.476			0.475		
Observations	89,980				89,970			89,970		

Panel E. Excluding industries with highest and lowest trade credit.

	Dependent variable = *TRADE CREDIT*$_{it}$						
	(1)				(2)		
	Excluding Highest Industries				*Excluding Lowest Industries*		
	Coeff.		*p*-value		Coeff.		*p*-value
COMPLIQ	-0.190	***	0.000		-0.212	***	0.000
CONTROLS	Yes				Yes		
Constant	0.213	***	0.000		0.236	***	0.000
Year Dummy	Yes				Yes		
Industry Dummy	Yes				Yes		
Country Dummy	Yes				Yes		
Adj. R^2	0.532				0.485		
Observations	59,892				89,400		

Notes: All continuous variables are winsorized at the 1st and 99th percentile. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively. Variable definitions are in Appendix A.

on observable firm characteristics used in the baseline regression analysis; therefore, the firms both in the treatment and control groups are basically identical in terms of asset liquidity. The only difference between the two groups is that our treatment group has higher liquidity than the control group. Panel B of Table 4 presents the PSM regression results. We find that the treatment effect continues to hold for all trade credit proxies. As indicated by the magnitude of the coefficients, the treatment effect is higher for the third (*TC3*) measure of trade credit. The results provide additional supporting evidence for the hypothesis that firms having higher asset liquidity are more likely to avoid trade credit.

Firm fixed effects

To further deal with concerns for unknown time-invariant unobserved firm characteristics, we run the baseline regression using firm and year fixed effects. Panel C of Table 4 reports the corresponding results. Across all models of trade credit, the estimation remains negative and significant at the 1% level, suggesting that our results from the baseline regression are not driven by significant omitted firm-level factors.

Alternative measures of asset liquidity

To address the possibility that our combined measure of asset liquidity is driving our main results, we replicate our baseline regressions using the components of our measure instead of *COMPLIQ*. We use all three components of our liquidity measure. Panel D of Table 4 presents the results of the regressions and shows that our results continue to be robust, suggesting that our baseline results are not conditional to a specific measure of asset liquidity.

Excluding industries with highest and lowest trade credit users

One may argue that industries that require the use of a higher amount of trade credit are driving our results, creating potential omitted variables bias. To address this concern, we identify five industries (defined by the Fama and French (1993) 48 industry (FF48) classification) that use the highest amount of trade credit in our sample, namely business service (FF48=34), wholesale (FF48=41), retail (FF48=42), electronic equipment (FF48=36), and machinery (FF48=21). Even after losing more than 34% of observations from our sample, the results presented in Panel E of Table 4 remain significant (p-value=0.0001) and negative (coefficient =-0.190) for all three models of trade credit, suggesting our main findings. We also drop the observations of the lowest five trade credit user industries and replicate our main regression. We find that the results are consistent with our main findings and suggest our hypothesis.

Robustness check

To further reinforce the reliability of our results, we conduct several robustness checks. We re-estimate our baseline regression excluding outliers and US observations, adding additional control variables, excluding countries that use the highest and lowest amount of trade credit, and finally using alternative econometric methods.

Dealing with an outlier

Following prior studies (e.g., Hidekazu (1991) and Díaz-García and González-Farías (2004)), we compute Cook's distance based on the multivariate linear regression method (Wang et al. 2018) and control our sample for unreasonable observations. This method led to an exclusion of 5,845 (9.6% of total observations) unreasonable observations. Panel A of Table 5 presents the results of the regression after excluding the outliers. The results are significant and consistent with our main findings and suggest that our results are not driven by unreasonable observations.

Excluding US sample

A significant part of our sample observations (21.94%) is from US firms. One may argue that the US observations are driving our results. To respond to this concern, we replicate our main regressions in Equation (1), and Table 5, Panel B, presents the results of the regressions. We find that the coefficient on *COMPLIQ* in all the columns remain significant (p-value<0.001) with expected signs, suggesting that our results are not driven by US observations from US firms.

Table 5. Asset liquidity and trade credit.

Panel A. Exclusion of outlier.

	Dependent variable = *TRADE CREDIT*$_{it}$										
	(1)				(2)				(3)		
	TC1				*TC2*				*TC3*		
	Coeff.		*p*-value		Coeff.		*p*-value		Coeff.		*p*-value
COMPLIQ	-0.060	***	0.000		-0.029	***	0.000		-0.045	***	0.000
CONTROLS	Yes				Yes				Yes		
Constant	0.188	***	0.000		0.157	***	0.000		0.162	***	0.000
Year Dummy	Yes				Yes				Yes		
Industry Dummy	Yes				Yes				Yes		
Country Dummy	Yes				Yes				Yes		
Adj. R^2	0.694				0.333				0.571		
Observations	84,162				84,162				84,162		

Panel B. Exclusion of US observations.

	Dependent variable = *TRADE CREDIT*$_{it}$										
	(1)				(2)				(3)		
	TC1				*TC2*				*TC3*		
	Coeff.		*p*-value		Coeff.		*p*-value		Coeff.		*p*-value
COMPLIQ	-0.030	***	0.000		-0.054	***	0.000		-0.077	***	0.000
CONTROL	-0.075	***	0.000		-0.210	***	0.000		-0.355	***	0.000
Constant	0.167	***	0.000		0.205	***	0.000		0.259	***	0.000
Year Dummy	Yes				Yes				Yes		
Industry Dummy	Yes				Yes				Yes		
Country Dummy	Yes				Yes				Yes		
Adj. R^2	0.295				0.492				0.605		
Observations	71,130				71,130				71,130		

Panel C. Excluding countries with the highest and lowest trade credit.

	Dependent variable = *TRADE CREDIT*$_{it}$						
	(1)				(2)		
	Excluding Highest 10				*Excluding Lowest 10*		
	Coeff.		*p*-value		Coeff.		*p*-value
COMPLIQ	-0.214	***	0.000		-0.210	***	0.000
CONTROLS	Yes				Yes		
Constant	0.227	***	0.000		0.234	***	0.000
Year Dummy	Yes				Yes		
Industry Dummy	Yes				Yes		
Country Dummy	Yes				Yes		
Adj. R^2	0.474				0.484		
Observations	79,461				88,547		

Panel D. Additional control variables.

	Dependent variable = *TRADE CREDIT*$_{it}$								
	(1)				(2)				(3)		
	TC1				*TC2*				*TC3*		
	Coeff.		*p*-value		Coeff.		*p*-value		Coeff.		*p*-value
COMPLIQ	-0.070	***	0.000		-0.038	***	0.000		-0.056	***	0.000
OTHER CONTROLS	Yes				Yes				Yes		
FIRMAGE	-0.003		0.497		0.004	*	0.083		0.002		0.554
DAC	-0.001	***	0.008		0.000		0.240		-0.001	*	0.046
FINDIST	0.024	***	0.000		0.005	*	0.068		0.014	***	0.000
Constant	0.202	***	0.000		0.183	***	0.000		0.199	***	0.000
Year Dummy	Yes				Yes				Yes		
Industry Dummy	Yes				Yes				Yes		
Country Dummy	Yes				Yes				Yes		
Adj. R^2	0.648				0.343				0.530		
Observations	18,151				18,151				18,151		

Notes: All continuous variables are winsorized at the 1st and 99th percentile. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively. Variable definitions are in Appendix A.

Excluding countries that use highest and lowest trade credit

Since we use international data from 69 countries, one may argue that countries that use the highest or lowest amount of trade credit may drive our results. To address this concern, we identify the top 10 countries that use the highest amount trade credit, namely, ISO788=Tunisia, ISO792=Turkey, ISO620=Portugal, ISO398=Kazakhstan, ISO40=Lithuania, ISO380=Italy, ISO124=Canada, ISO32=Argentina, ISO356=India, and ISO203=Czech Republic. Excluding the observations associated with these countries, we re-estimate Equation (1) and report the results in Panel C of Table 5. Despite a loss of 11.82% of observations, we find that the coefficient on *COMPLIQ* remains significant with expected signs. We also drop the 10 countries that use the lowest amount of trade credit and find that the results do not change. These results suggest that our estimation of Equation (1) is not driven by country specific observations.

Additional control variables

In this section, we perform regressions to determine whether our results are robust to the inclusion of additional control variables that other studies (e.g., Chen et al. (2017) and Hasan and Habib (2019)) have found affect a firm's use of trade credit. These variables include discretionary accruals (*DAC*) as a proxy for accounting quality, firm age (*FIRMAGE*), and financial distress (*FINDIST*). We do not include these variables in our main regression model because the inclusion dramatically reduces our sample size (from 90,119 observations to 18,151 observations). Panel D of Table 5 reports the results of the regressions. We find that the coefficient of *COMPLIQ* remains negative (coefficient = -0.070) and statistically significant (p-value<0.001), suggesting that our results are robust to the inclusion of additional control variables.

VI. Conclusion

In this article, we examine whether asset liquidity plays a role in the firm's use of trade credit. From literature on trade credit and asset liquidity, we develop a hypothesis in relation to asset liquidity and trade credit. Firms having higher asset liquidity have better access to alternative sources of low cost external financing, and they try to avoid costly trade credit. Firms' access to external alternative sources of financing depends on different factors such as better accounting quality, firm size and credit rating, internal control weaknesses, or collateral. A firm's asset liquidity may also be a reason for firms to have better access to alternative sources of financing. Therefore, we predicted that firms having higher asset liquidity prefer to use less trade credit.

Using a large international sample of 69 countries, we show that firms having higher asset liquidity are less likely to use trade credit. We address the concerns of omitted variable bias and the problems of endogeneity by using a change regression, excluding outliers, using firm and year fixed effects in the estimation, and using alternative measures of trade credit and asset liquidity. In all of those tests, we find robust results in support of our hypothesis, finding that firms having higher asset liquidity use less trade credit.

Our findings contribute to the growing literature of asset liquidity and trade credit. This is the first study to investigate the relation between asset liquidity and trade credit. The findings are important for international investors, financial policy makers, and researchers.

References

Boubaker, S., Saffar, W., and Sassi, S. 2018. "Product market competition and debt choice." *Journal of Corporate Finance* 49: 204-224. https://doi.org/10.1016/j.jcorpfin.2018.01.007

Charoenwong, C., Chong, B. S., and Yang, Y. C. 2014. "Asset liquidity and stock liquidity: international evidence." *Journal of Business Finance & Accounting* 41 (3-4): 435-468. https://doi.org/10.1111/jbfa.12052

Chen, S., Ma, H., and Wu, Q. 2019. "Bank credit and trade credit: Evidence from natural experiments." *Journal of Banking & Finance* 108: 105616. https://doi.org/10.1016/j.jbankfin.2019.105616

Chen, D., Liu, M., Ma, T., and Martin, X. 2017. "Accounting quality and trade credit." *Accounting Horizons* 31 (3): 69-83. https://doi.org/10.2308/acch-51711

Cheung, W. M., Im, H. J., and Zhang, B. 2018. "The effect of stock liquidity on debt-equity choices." Working Paper. https://papers.ssrn.com/sol3/Papers.cfm?abstract_id=2881170

Colla, P., F. Ippolito, and K. Li. 2013. "Debt specialization." *The Journal of Finance* 68 (5): 2117–2141. https://doi.org/10.1111/jofi.12052

Coleman, S. 2005. "Free and costly trade credit: A comparison of small firms." *The Journal of Entrepreneurial Finance* 10 (1): 75-101. https://digitalcommons.pepperdine.edu/jef/vol10/iss1/6

Correia, S. 2016. "A Feasible Estimator for Linear Models with Multi-Way Fixed Effects." *Working Paper*, Duke University, Durham, NC.

Delannay, A. F., and Weill, L. 2004. "The determinants of trade credit in transition countries." *Economics of Planning* 37 (3): 173-193. https://doi.org/10.1007/s10644-005-5062-9

Díaz-García, J. A., and González-Farías, G. 2004. "A note on the Cook's distance." *Journal of Statistical Planning and Inference* 120 (1-2): 119-136. https://doi.org/10.1016/S0378-3758(02)00494-9

Emery, G. W. 1984. "A Pure Financial Explanation for Trade Credit." *Journal of Financial and Quantitative Analysis* 19 (3): 271–285. doi:10.2307/2331090

Fama, E., and K. French. 1993. "Common Risk Factors in the Returns on Stocks and Bonds." *Journal of Financial Economics* 33 (1): 3–56. doi:10.1016/0304-405X(93)90023-5

Ferris, J. S. 1981. "A transactions theory of trade credit use." *The Quarterly Journal of Economics* 96 (2): 243-270. https://doi.org/10.2307/1882390

Fisman, R. 2001. "Trade credit and productive efficiency in developing countries." *World Development* 29 (2): 311-321. https://doi.org/10.1016/S0305-750X(00)00096-6

Gatev, E., Schuermann, T., and Strahan, P. E. 2009. "Managing bank liquidity risk: How deposit-loan synergies vary with market conditions." *The Review of Financial Studies* 22 (3): 995-1020. https://doi.org/10.1093/rfs/hhm060

González, R. L., Lopez, J. A., and Saurina, J. 2007. "Determinants of access to external finance: evidence from Spanish firms". *Working Paper 2007-22*. Federal Reserve Bank of San Francisco. https://core.ac.uk/download/pdf/6649034.pdf

Gopalan, R., Kadan, O., and Pevzner, M. 2012. "Asset liquidity and stock liquidity." *Journal of Financial and Quantitative Analysis* 47 (2): 333-364. https://www.jstor.org/stable/41499473

Gwatidzo, T., and Ojah, K. 2014. "Firms' debt choice in Africa: are institutional infrastructure and non-traditional determinants important?" *International Review of Financial Analysis* 31: 152-166. https://doi.org/10.1016/j.irfa.2013.11.005

Hasan, M. M., and Habib, A. 2019. "Social capital and trade credit." *International Review of Financial Analysis* 61: 158-174. https://doi.org/10.1016/j.irfa.2018.10.002

Hidekazu, T. 1991. "Detecting influential observations by using a new expression of Cook's distance." *Communications in Statistics-Theory and Methods* 20 (1): 261-274. https://doi.org/10.1080/03610929108830495

Islam, M. N. 2018. "Three Essays on Financial Statement Comparability." *FIU Electronic Theses and Dissertations* 3760. Florida International University: Miami, FL. https://digitalcommons.fiu.edu/etd/3760/

Islam, M. N., and Wheatley, C. M. 2021. "Impact of Climate Risk on Firms' Use of Trade Credit: International Evidence." *The International Trade Journal* 35 (1): 40-59. https://doi.org/10.1080/08853908.2020.1847217

Jank, S., Roling, C., and Smajlbegovic, E. 2016. "Flying under the radar: The effects of short-sale disclosure rules on investor behavior and stock prices." *Journal of Financial Economics* 139 (1): 209-233. https://doi.org/10.1016/j.jfineco.2020.07.010

Kinzius, L., Sandkamp, A., and Yalcin, E. 2019. "Trade protection and the role of non-tariff barriers." *Review of World Economics* 155 (4): 603-643. https://doi.org/10.1007/s10290-019-00341-6

Klapper, L., L. Laeven, and R. Rajan. 2012. "Trade Credit Contracts." *The Review of Financial Studies* 25 (3): 838–867. doi:10.1093/rfs/hhr122

Levine, R., Lin, C., and Xie, W. 2018. "Corporate resilience to banking crises: The roles of trust and trade credit." *Journal of Financial and Quantitative Analysis* 53 (4): 1441-1477. https://doi.org/10.1017/S0022109018000224

Li, N., Lou, Y., Otto, C. A., and Wittenberg-Moerman, R. 2021. “Accounting quality and debt concentration.” *The Accounting Review* 96 (1): 377-400. https://doi.org/10.2308/tar-2017-0250

Li, N., Lou, Y., Otto, C., and Wittenberg-Moerman, R. W. 2014. “Accounting quality and debt concentration: Evidence from internal control weakness disclosures.” *Working Paper No. hal-02011410*. https://ideas.repec.org/p/hal/wpaper/hal-02011410.html

Lipson, M. L., and Mortal, S. 2009. “Liquidity and capital structure.” *Journal of Financial Markets* 12 (4): 611-644. https://doi.org/10.1016/j.finmar.2009.04.002

Long, M. S., Malitz, I. B., and Ravid, S. A. 1993. “Trade credit, quality guarantees, and product marketability.” *Financial Management* 22 (4): 117-127. https://www.jstor.org/stable/3665582

M Marks, J. M., and Shang, C. 2021. “Does stock liquidity affect corporate debt maturity structure?” *Quarterly Journal of Finance* 11 (01): 2150005. https://doi.org/10.1142/S2010139221500051

Molina, C. A., and L. A. Preve. 2012. “An Empirical Analysis of the Effect of Financial Distress on Trade Credit.” *Financial Management* 41 (1): 187–205. doi:10.1111/j.1755-053X.2012.01182.x

Morellec, E. 2001. “Asset liquidity, capital structure, and secured debt.” *Journal of Financial Economics* 61 (2): 173-206. https://doi.org/10.1016/S0304-405X(01)00059-9

Munch, J., and Schaur, G. 2018. “The effect of export promotion on firm-level performance.” *American Economic Journal: Economic Policy* 10 (1): 357-87. doi: 10.1257/pol.20150410

Ortiz-Molina, H., and Phillips, G. M. 2014. “Real asset illiquidity and the cost of capital.” *The Journal of Financial and Quantitative Analysis* 49 (1): 1-32. https://www.jstor.org/stable/43303867

Petersen, M. A., and Rajan, R. G. 1994. “The benefits of lending relationships: Evidence from small business data.” *The Journal of Finance* 49 (1): 3-37. https://doi.org/10.1111/j.1540-6261.1994.tb04418.x

Petersen, M. A., and Rajan, R. G. 1997. “Trade credit: Theories and evidence.” *The Review of Financial Studies* 10 (3): 661-691. https://doi.org/10.1093/rfs/10.3.661

Pham, L. T. M., Van Vo, L., Le, H. T. T., and Le, D. V. 2018. “Asset liquidity and firm innovation.” *International Review of Financial Analysis* 58: 225-234. https://doi.org/10.1016/j.irfa.2017.11.005

Safavian, S. M. 2008. “Firm-level evidence on collateral and access to finance.” In *Secured Transactions Reform and Access to Credit* edited by F. Dahan and J. Simpson, 110-121. Cheltenham, UK: Edward Elgar. http://ndl.ethernet.edu.et/bitstream/123456789/17505/1/326.pdf#page=121

Schwartz, R. A. (1974). “An economic model of trade credit.” *The Journal of Financial and Quantitative Analysis* 9 (4): 643-657. https://doi.org/10.2307/2329765

Shang, C. 2020. “Trade credit and stock liquidity.” *Journal of Corporate Finance* 62: 101586. https://doi.org/10.1016/j.jcorpfin.2020.101586

Sibilkov, V. (2009). “Asset liquidity and capital structure.” *The Journal of Financial and Quantitative Analysis* 44 (5): 1173-1196. https://www.jstor.org/stable/40505964

Smith, J. K. (1987). “Trade credit and informational asymmetry.” *The Journal of Finance* 42 (4): 863-872. https://doi.org/10.1111/j.1540-6261.1987.tb03916.x

Wang, Y., Liu, Q., Hou, H. D., Rho, S., Gupta, B., Mu, Y. X., and Shen, W. Z. 2018. "Big data driven outlier detection for soybean straw near infrared spectroscopy." *Journal of Computational Science* 26: 178-189. https://doi.org/10.1016/j.jocs.2017.06.008

Williams, F. 2008. "World Bank Urged to Lift Trade Credit Finance." *Financial Times*, November 11. https://www.ft.com/content/9ebcdfaa-b012-11dd-a795-0000779fd18c

Appendix A

Variable	Definition	Source
Trade Credit 1	Ratio of accounts payable (*AP*) to book value of total assets (*AT*).	Compustat Global
Trade Credit 2	Ratio of sum of accounts payable (*AP*) and notes payable (*NP*) to total assets (*AT*) .	Compustat Global
Trade Credit 3	Ratio of sum of accounts payable (*AP*), notes payable (*NP*), and short-term debt in current liability (*DLC*) to total assets (*AT*).	Compustat Global
COMLIQ	Weighted average asset liquidity, calculated as the sum of WAL1, WAL2, and WAL3 divided by 3.	Compustat Global
SIZE	Natural log of total assets (*AT*).	Compustat Global
LEVERAGE	Ratio of long-term debt (*DLTT*) to total assets (*AT*).	Compustat Global
MKTSHARE	Market share of sales calculated as the ratio of the firm's sales over total industry sales, where industry classification is based on Fama and French's 48 industries.	Compustat Global
R&D	Research and development expenditure (*XRD*) scaled by total assets (*AT*).	Compustat Global
REPE	Firm maturity measured by retained earnings (*RE*) scaled by total equity (*CEQ*).	Compustat Global
CASHHOLD	Cash and marketable securities (*CHE*) divided by total assets (*AT*).	Compustat Global
CAPINT	Capital intensity, measured as property, plant, and equipment (*PPENT*) scaled by total asset (*AT*).	Compustat Global
LIQUIDCOST	Liquid costs calculated as the ratio of raw materials (*INVR*) to total assets (*AT*).	Compustat Global
INTANG	Intangibility of firm calculated as the ratio of intangible assets (*INTAN*) to total assets (*AT*).	Compustat Global
CLXTRADE	Current liabilities excluding accounts payable scaled by total assets (*AT*).	Compustat Global
RECSLACK	Recoverable slack calculated as the ratio of current assets (*ACT*) minus inventories (*INVT*) divided by current liabilities (*LCT*).	Compustat Global
POTSLACK	Potential slack measured as the ratio of debt (*DLTT*) to sales (*SALE*).	Compustat Global
GDPGR	GDP growth rate of a country.	worldbank.org
POPDEN	Population density per square kilometer.	worldbank.org