Trade Credit and Collateral Market Valuation

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- **Main questions**:

1. What is the role of collateral valuation in trade credit relationships?
2. Is the market value of real estate (RE) held by a firm relevant for its levels of accounts receivable and payable?

- Definition of trade credit (*tc*):

→ Credit offered by a supplier that allows the customer to delay the payment of a transaction that involves the purchase of intermediate inputs.

- It is important to study *tc* and its determinants:

- In 50% of the countries, firms recognize *tc* as more important than banking sources (Enterprise Survey, World Bank).
- In 2019, US non-financial firms had an amount of *tc* equivalent to 21% of GDP (García-Marín et al., 2020).
- In the US, up to 90% of inter-firm trade between non-financial firms is supported by *tc* (Costello, 2019).
- Two thirds of global trade is financed via *tc* (Bank of International Settlements, 2014).

⇒ Given the magnitude and importance of this source of financing, if collateral value is a significant determinant, fluctuations in collateral valuation could have relevant macroeconomic consequences via *tc* fluctuations.

Roadmap

1. Building collateral market value.

2. Empirical model and main results.

3. A simple theoretical model to rationalize main results.

The procedure follows Chaney et al. (2012) with physical assets = RE:

- Two issues with COMPUSTAT (CO) data:
  1. Physical assets are valued at historical cost.
  2. Accumulated depreciation of physical assets was last reported in 1993.
- How to measure RE market value?
  1. Three categories of physical assets: Buildings, Land and Improvement, and Construction in Progress.
  2. Measure the proportion of the gross book value of a building claimed as depreciation.
  3. Estimate average purchase year of firms' RE, assuming linear depreciation and a depreciable life of 40 years.
  4. Estimate RE market value by inflating its historical value with a cumulative property price index from the average purchase year to the corresponding year in the sample.
  5. The property price index is computed using CPI before 1975, and local residential RE prices after 1975.
- Three important limitations:
  1. The methodology restricts the sample to firms active in 1993.
  2. The methodology assumes that most of the RE owned by a firm are in the same location than its headquarters (Chaney et al. (2012) verify that this is a reasonable assumption).
  3. A potential source of noise in the regressions is that the property price index used to estimate the market value of RE reflects the situation in the local residential sector and not in the commercial sector.

- Regarding the baseline sample. (Table 4)

  → It considers more than 2,500 firms coming from 53 different industries according to the SIC2 classification, with observations between 1993 and 2018, excluding 2008.

  → It includes firms whose headquarters are located in the US, and excludes firms operating in the industries of FIRE, mining, construction, and those who are unclassified (SIC2 code 99), as well as firms involved in a major takeover operation.

  → I require firms to appear at least three consecutive years, and I keep only firms that have available data every consecutive year they appear in the sample.

  → Consistent with the literature (Rajan and Zingales, 1995), accounts receivable of the median firm in the sample correspond to almost 14% of its total assets, while accounts payable represent more than 17% of its total liabilities.

- CO has a highly restricted sample, and the procedure used to estimate RE restricts the sample even further. (Table 5)

  → The baseline sample used in this project is composed by smaller and older firms that show less trade credit usage and smaller balance sheets compared to the firms in the full sample.

  → These characteristics can be linked to the fact that the methodology employed restrict the sample to only those firms active in 1993.

I estimate using OLS the following linear model for firm i, operating in location $l(i)$, and industry $s(i)$ at period t:

$$dep_{i,t} = \alpha_i + \eta_{s(i),t} + \beta \times RE^j_{i,t} + \gamma \times P^j_{l(i),t} + \left(C_{i,t-1}\right)' \Theta + \mathcal{X}^j_{i,l(i),t}\zeta + \varepsilon_{i,t} \quad (1)$$

Where $C_{i,t}$ is a set of observable characteristics (Klapper et al., 2012; Costello, 2019):

$$\left(C_{i,t-1}\right)' = \left[\, size_{i,t-1} \;\; cash_{i,t-1} \;\; debt_{i,t-1} \;\; inventories_{i,t-1} \;\; old_{i,t} \,\right]$$

- $\{\alpha_i, \eta_{s(i),t}\}$ are firm and industry-year fixed-effects.
- $dep_{i,t} = \{(ar/sales)_{i,t}, (ap/costs)_{i,t}\}$ are two dependent variables.
  1. $(ar/sales)_{i,t}$: share of total sales that has been made on a *tc* basis.
  2. $(ap/costs)_{i,t}$: share of total costs that has been covered on a *tc* basis.
- $\left\{RE^j_{i,t}, P^j_{l(i),t}\right\}_{j=\{state,msa\}}$ are two sets of main dependent variables.
  - → $P^j_{l(i),t}$ controls for the overall impact of RE cycle on $dep_{i,t}$, irrespective whether firm i holds RE or not.
  - → I follow the investment related literature (Fazzari et al., 1988; Kaplan and Zingales, 1997; Almeida et al., 2004; Chaney et al., 2012) in using the lagged value of capital as the scaling variable for RE.
  - → Therefore, $RE^j_{i,t}$ represents the ratio of the estimated market value of RE hold by firm i scaled by the lagged value of firm's capital.
- To avoid spurious correlation from using same scaling variable in debt-related variables, I include the inverse of firm's capital as a control.
- Results are robust to use lagged total adjusted assets as the RE's scaling variable (Cvijanovic, 2014; Bahaj et al., 2020).

- Why include the $\mathcal{X}^j_{i,l(i),t}$ term? Decision of holding RE is not random.
  - → Initial RE-holdings could be correlated with omitted characteristics that govern firm's sensitivity to RE valuation.
  - → If large firms are more sensitive to local demand shocks, my analysis would be based on a spurious correlation $\Rightarrow \beta$ overestimation.
  - → The term $\mathcal{X}^j_{i,l(i),t} = P^j_{l(i),t} \cdot (C_{i,93})'$, firm i's initial controls interacted with local prices, controls for this extra sensitivity.
  - → Strategy based on the fact that $C_{i,t}$ identify characteristics that determine RE ownership, and also make the firm more sensitive to local RE price fluctuations (Chaney et al., 2012; Cvijanovic, 2014; Bahaj et al., 2020).
  - → However, some determinants of RE-holding might be unobservable and could vary with time.

- Two sources of variation:
  1. One comes from variations across firms in the initial quantity of RE that they hold.
  2. The other one comes from the different fluctuations in the local price of these assets.

- Identification relies on fluctuations in the market value of the collateral owned and not in the quantity owned.
  - → This helps to alleviate a possible identification concern related to a possible endogeneity in RE-holdings after the start of the sample.

- β measures how a firm's shares of accounts receivable and payable respond to each additional increase in the market value of the RE that the firm actually owns relative to its capital level.
  - → This specification allows the abstraction of local RE shocks that affect both firms with and without RE on their balance sheet.

Table 1: Pooled OLS with the share of accounts payable as the dependent variable (1993-2018)[a].

	Share of accounts payable $(ap/costs)_{i,t}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$RE^{state}_{i,t}$	0.009***	0.009***	0.006***			
	(0.002)	(0.002)	(0.002)			
$RE^{msa}_{i,t}$				0.008***	0.010***	0.006**
				(0.002)	(0.002)	(0.002)
$size_{i,t-1}$	0.033***	0.033***	0.034***	0.027***	0.030***	0.030***
	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
$cash_{i,t-1}$	0.003	0.008	-0.001	0.010	0.011	-0.001
	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)
$debt_{i,t-1}$	-0.001	-0.005	-0.002	-0.010	-0.013*	-0.006
	(0.005)	(0.006)	(0.005)	(0.007)	(0.007)	(0.007)
$inventories_{i,t-1}$	0.070***	0.076***	0.071***	0.067***	0.069***	0.063***
	(0.012)	(0.014)	(0.013)	(0.015)	(0.017)	(0.015)
$old_{i,t}$	-0.017***	-0.016***	0.006	-0.025***	-0.019**	0.015
	(0.005)	(0.005)	(0.038)	(0.008)	(0.008)	(0.038)
Fixed-effects						
- firm	Yes	Yes	Yes	Yes	Yes	Yes
- industry ## year	Yes	Yes	Yes	Yes	Yes	Yes
R.E. prices	Yes	Yes	Yes	Yes	Yes	Yes
Lagged dependent variable	No	No	Yes	No	No	Yes
Init. controls # R.E. prices	No	Yes	Yes	No	Yes	Yes
Observations	26,351	23,336	20,401	16,127	14,496	13,042
Adjusted R^2	0.538	0.539	0.617	0.491	0.505	0.610
Firms	3,487	3,059	2,824	1,938	1,777	1,688

[a] Standard errors are reported in parenthesis, clustered at state-year level when state-level prices are used to construct the main independent variable, and at MSA-year level when MSA-level prices are used to construct the main independent variable. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Fixed-effects, real estate prices, the lagged value of the dependent variable, and the interaction between initial controls and real estate prices are included in some regressions but not reported.

Table 2: Pooled OLS with the share of accounts receivable as the dependent variable (1993-2018)[a].

	Share of accounts receivable $(ar/sales)_{i,t}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$RE^{state}_{i,t}$	0.012***	0.011***	0.011***			
	(0.002)	(0.002)	(0.002)			
$RE^{msa}_{i,t}$				0.009***	0.011***	0.011***
				(0.002)	(0.002)	(0.002)
$size_{i,t-1}$	0.044***	0.044***	0.047***	0.041***	0.045***	0.045***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
$cash_{i,t-1}$	-0.023***	-0.023***	-0.008	-0.014**	-0.019***	-0.004
	(0.005)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)
$debt_{i,t-1}$	-0.011**	-0.009	0.000	-0.014**	-0.006	0.005
	(0.005)	(0.006)	(0.005)	(0.007)	(0.007)	(0.007)
$inventories_{i,t-1}$	0.026**	0.030**	0.036***	0.028**	0.035**	0.042***
	(0.012)	(0.013)	(0.014)	(0.014)	(0.016)	(0.016)
$old_{i,t}$	-0.009	-0.008	0.049	-0.008	-0.004	0.050
	(0.006)	(0.006)	(0.038)	(0.010)	(0.009)	(0.038)
Fixed-effects						
- firm	Yes	Yes	Yes	Yes	Yes	Yes
- industry ## year	Yes	Yes	Yes	Yes	Yes	Yes
R.E. prices	Yes	Yes	Yes	Yes	Yes	Yes
Lagged dependent variable	No	No	Yes	No	No	Yes
Init. controls # R.E. prices	No	Yes	Yes	No	Yes	Yes
Observations	26,313	23,302	20,369	16,115	14,483	13,022
Adjusted R^2	0.511	0.515	0.569	0.450	0.481	0.545
Firms	3,483	3,054	2,824	1,938	1,776	1,688

[a] Standard errors are reported in parenthesis, clustered at state-year level when state-level prices are used to construct the main independent variable, and at MSA-year level when MSA-level prices are used to construct the main independent variable. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Fixed-effects, real estate prices, the lagged value of the dependent variable, and the interaction between initial controls and real estate prices are included in some regressions but not reported.

Table 3: Pooled OLS using state-level prices (1993-2018)[a].

	$(ar/sales)_{i,t}$	$(ap/costs)_{i,t}$	$(nar/sales)_{i,t}$	$(notes\ pay)_{i,t}$	$(debt\ iss)_{i,t}$	$(debt\ rep)_{i,t}$	$(debt\ cha)_{i,t}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$RE^{state}_{i,t}$	0.011***	0.006***	0.006***	0.017***	0.038**	0.044***	-0.004
	(0.002)	(0.002)	(0.002)	(0.006)	(0.019)	(0.010)	(0.010)
$size_{i,t-1}$	0.047***	0.034***	0.016***	0.002	-0.011	0.034***	-0.032***
	(0.003)	(0.003)	(0.003)	(0.007)	(0.020)	(0.010)	(0.010)
$cash_{i,t-1}$	-0.008	-0.001	0.024***	-0.085***	-0.023	-0.040	0.024
	(0.006)	(0.006)	(0.006)	(0.020)	(0.054)	(0.030)	(0.026)
$debt_{i,t-1}$	0.000	-0.002	-0.005	0.021	-0.053	0.354***	-0.205***
	(0.005)	(0.005)	(0.006)	(0.022)	(0.064)	(0.036)	(0.038)
$inventories_{i,t-1}$	0.036***	0.071***	0.005	0.256***	0.706***	0.010	0.234***
	(0.014)	(0.013)	(0.015)	(0.052)	(0.141)	(0.071)	(0.074)
$old_{i,t}$	0.049	0.006	-0.061**	0.063	-0.097	-0.118	0.015
	(0.038)	(0.038)	(0.030)	(0.062)	(0.310)	(0.094)	(0.135)
Fixed-effects							
- firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- industry ## year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R.E. prices	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lagged dependent variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Init. controls # R.E. prices	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	20,369	20,401	20,367	20,401	18,981	19,619	18,468
Adjusted R^2	0.569	0.617	0.623	0.534	0.316	0.427	0.0914
Firms	2,824	2,824	2,824	2,824	2,775	2,790	2,750

[a] Standard errors are reported in parenthesis, clustered at state-year level. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Fixed-effects, real estate prices, the lagged value of the dependent variable, and the interaction between initial controls and real estate prices are included but not reported.

1. Endogeneity I: Decision of holding RE is not random. (Table 12)

   → Inclusion of firms' initial controls interacted with local prices (Chaney et al., 2012).
   → Wider gap (at least 9 years) between RE acquisition and the start of the sample (Bahaj et al., 2020).

2. Endogeneity II: Property prices might be correlated with *tc* opportunities of RE-owner firms. (Tables 7, 8, 9, 10 and 11)

   → IV approach: Two instruments of RE prices using local housing supply elasticity and long-term interest rate (Mian and Sufi, 2011).
   → Sub-sample of firms operating in the tradable goods sector, firms less sensitive to local economic condition (Mian and Sufi, 2014).
   → Sub-sample of small firms located in large MSAs, firms without sizable impact on local conditions (Chaney et al., 2012).

⇒ In general, similar results for $\hat{\beta}$ across the different instruments and sub-samples.

3. Is there a dynamic effect? $\hat{\beta}$ for different lagged/forward values of the dependent variable. (Figure 1)

   → The response is stable for two years in the case of $(ar/sales)_{i,t}$, before decaying and becoming non-significant.
   → The response is significant only in the contemporaneous period in the case of $(ap/costs)_{i,t}$.

4. Are financially constrained firms (FCF) more sensitive? (Tables 13, 14 and 15)

   → Three simple definitions of FCF (Almeida et al., 2004; Faulkender and Petersen, 2006):
   1. Unconstrained (Un): bottom three deciles of the dividend payout' distribution for every year. / Constrained (Co): top three deciles of the dividend payout' distribution for every year.
   2. Un: bottom three deciles of total assets' distribution for every year. / Co: top three deciles of total assets' distribution for every year.
   3. Un: those with long-term debt outstanding and bonds rated by S&P. / Co: those without a bond rating.

⇒ In general, shares of accounts receivable and payable of FCF are significantly more sensitive: $\hat{\beta}_{\text{Un}} < \hat{\beta}_{\text{Co}}$.

- Firm $j \in S$ borrows an amount BC_j of bank credit. The firm repays its debt in full with exogenous probability p_1, and default with probability $(1 - p_1)$.

- The firm holds an amount of RE k_j that depreciates at a rate δ. It can be pledged as collateral and transferred to the lender in case of default.

- Current market value of the RE hold by firm j located in $l(j)$ is denoted as $q_{l(j)}$.

- Firms face a borrowing constraint on the size of the banking loan: BC_j is bounded from above by a fraction $\theta_j^B \in [0,1]$ of the current market value of their RE. Define $\phi_j^B \in [0,1]$ as the tightness of this constraint.

$$BC_j \quad \leq \quad \theta_j^B q_{l(j)} k_j \qquad \Leftrightarrow \qquad BC_j / \left(\theta_j^B q_{l(j)} k_j\right) \quad = \quad \phi_j^B \quad \leq \quad 1$$

- Banks are risk-neutral, and loans are priced competitively. The optimal interest rate charged by banks is:

$$(1 + r_j^B) \quad = \quad \left[1 - (1 - p_1)(1 - \delta)\eta_j^B q'_{l(j)} / (q_{l(j)} \phi_j^B \theta_j^B)\right] / p_1$$

- Future value of RE prices follows a Fréchet distribution, where $P_{l(j)} > 0$ is a measure of aggregate RE prices in location $l(j)$.

$$Pr\left(q'_{l(j)} < q\right) \quad = \quad \exp\left(-P_{l(j)} q^{-\theta}\right) \qquad \text{for} \qquad q \quad > \quad 0$$

- Therefore, the distribution of the interest rate charged banks is given by:

$$Pr\left(1 + r_j^B < R\right) \quad = \quad 1 - \exp\left(-\Phi_j^B (1 - p_1 R)^{-\theta}\right) \qquad \text{with} \qquad \Phi_j^B \quad = \quad P_{l(j)} \left[(1 - p_1)(1 - \delta)\eta_j^B\right]^{\theta} \left[q_{l(j)} \phi_j^B \theta_j^B\right]^{-\theta}$$

- Two differences between banks and suppliers:
  1. Banks comparative advantage: suppliers face a cost when issuing tc. It is decreasing in current market value of the collateral, and increasing in the tc supplied.

$$c^1(q_{l(i)}k_i, AP_{ji}) \quad \text{with} \quad c_1^1(\cdot) < 0 \quad \text{and} \quad c_2^1(\cdot) > 0$$

  2. Suppliers comparative advantage: the collateral has an internal value for the supplier, i.e. the supplier can produce using this RE. Therefore, the supplier compares RE internal and external value. The productivity of this input follows a Fréchet distribution, where $T_{l(i)}$ is the aggregate productivity in location $l(i)$.

$$Pr\left(z_i' < z\right) = \exp\left(-T_{l(i)}z^{-\theta}\right) \quad \text{for} \quad z > 0$$

- AP_{ji} is the trade credit obtained from industry $i \in S_{-j}$.

- Supplier's framework is the same than in the banking sector. Therefore, the optimal interest rate charged by suppliers is:

$$(1 + r_{ji}^T) = \left[1 - (1 - \tilde{p}_1(q_{l(i)}k_i))(1 - \delta)\eta_{ji}^T p_{ji}'/(q_{l(j)}\phi_{ji}^T\theta_{ji}^T)\right]/p_1 \quad \text{with} \quad (1 - \tilde{p}_1(q_{l(i)}k_i)) = (1 - p_1) - c(q_{l(i)}k_i)$$

- The distribution of the future RE value faced by the supplier is given by:

$$Pr\left(p_{ji}' < p\right) = Pr\left(\max\{q_{l(j)}', z_i'\} < p\right) = \exp\left(-P_{ji}p^{-\theta}\right) \quad \text{with} \quad P_{ji} = P_{l(j)} + T_i \quad \text{and} \quad p > 0$$

- Therefore, the distribution of the interest rate charged by suppliers correspond to:

$$Pr\left(1 + r_{ji}^T < R\right) = 1 - \exp\left(-\Phi_{ji}^T(1 - p_1R)^{-\theta}\right) \quad \text{with} \quad \Phi_{ji}^T = P_{ji}\left[[1 - \tilde{p}_1(q_ik_i)](1 - \delta)\eta_{ji}^T\right]^{\theta}\left[q_{l(j)}\phi_{ji}^T\theta_{ji}^T\right]^{-\theta}$$

- *tc* is supplied by the industry offering the lowest rate, i.e. $1 + r_j^T = \min_{k \in S_{-j}} \left\{ 1 + r_{jk}^T \right\}$. Therefore, the distribution of *tc* interest rate correspond to:

$$Pr\left(1 + r_j^T < R\right) \quad = \quad 1 - \exp\left(-\Phi_j^T (1 - pR)^{-\theta}\right) \qquad \text{with} \qquad \Phi_j^T \quad = \quad \sum_{k \in S_{-j}} \Phi_{jk}^T$$

- The firm compares interest rates charged by banks and suppliers. The probability that the banking sector is the least cost credit provider is:

$$Pr\left(1 + r_j^B < 1 + r_j^T\right) \quad = \quad \pi_j^B \quad = \quad \frac{\Phi_j^B}{\Phi_j^B + \Phi_j^T}$$

- If F_j denotes the total financing required by firm j, we must have:

$$F_j \quad = \quad BC_j + \sum_{k \in S_{-j}} AP_{jk} \quad = \quad \left[\frac{BC_j}{q_{l(j)} k_j} + \sum_{k \in S_{-j}} \frac{AP_{jk}}{q_{l(j)} k_j} \right] q_{l(j)} k_j \quad \leq \quad \left[\theta_j^B + \sum_{k \in S_{-j}} \theta_{jk}^T \right] q_{l(j)} k_j \quad = \quad \Theta_j q_{l(j)} k_j$$

- Defining $\Phi_j \in [0, 1]$ as the tightness of this last constraint, I conclude:

$$\Phi_j \quad = \quad \frac{F_j}{\Theta_j q_{l(j)} k_j} \quad \leq \quad 1 \qquad \Leftrightarrow \qquad F_j \quad = \quad \Phi_j \Theta_j q_{l(j)} k_j$$

A simple model: summary and three main conclusions

- Assuming $\theta_{jk}^T = \theta_j^B$ and $\eta_{jk}^T = \eta_j^B \quad \forall k \in S_{-j}$, and that the firm is constrained, i.e. $\phi_{jk}^T = \phi_j^B = \Phi_j = 1$, the probability of each credit source being the least cost credit provider is given by:

$$\pi_{ji}^T = \frac{\Omega_i^j \tilde{c}_i}{\sum\limits_{k \in S_{-j}} \Omega_k^j \tilde{c}_k + 1} \qquad \pi_j^T = \sum_{i \in S_{-j}} \pi_{ji}^T \qquad \pi_j^B = \frac{1}{\sum\limits_{k \in S_{-j}} \Omega_k^j \tilde{c}_k + 1} \quad \text{with} \quad \Omega_k^j = 1 + \frac{T_k}{P_{l(j)}} \quad \text{and} \quad \tilde{c}_k = \left(1 - \frac{c(q_{l(k)} k_k))}{(1 - p_1)}\right)^\theta$$

- Therefore, the different credit flows correspond to:

$$AP_{ji} = \pi_{ji}^T \Theta_j q_{l(j)} k_j \qquad AP_j = \sum_{i \in S_{-j}} AP_{ji} = \pi_j^T \Theta_j q_{l(j)} k_j \qquad BC_j = \pi_j^B \Theta_j q_{l(j)} k_j$$

- Three main conclusions:

1. Accounts receivable are increasing in the value of lender's collateral:

$$\frac{\partial AR_i}{\partial q_{l(i)}} = \sum_{k \in S_{-i}} \frac{\partial \pi_{ki}^T}{\partial q_{l(i)}} \Theta_k q_{l(k)} k_k > 0 \quad \text{since} \quad AR_i = \sum_{k \in S_{-i}} AP_{ki} = \sum_{k \in S_{-i}} \pi_{ki}^T \Theta_k q_{l(k)} k_k \quad \text{and} \quad \frac{\partial c(q_{l(i)} k_i)}{\partial q_{l(i)}} < 0$$

2. Accounts payable are increasing in the value of borrower's collateral:

$$\frac{\partial AP_j}{\partial q_{l(j)}} = \pi_j^T \Theta_j k_j > 0$$

3. Bank credit is increasing in the value of borrower's collateral:

$$\frac{\partial BC_j}{\partial q_{l(j)}} = \pi_j^B \Theta_j k_j > 0$$

Conclusions

- Evidence showing that *tc* has an important collateral component.
- Main results: existence of a relationship between market value of the collateral owned by firms and their *tc* relationships.
  1. Higher collateral valuation (relative to firm's capital) implies a higher share of total sales made on a *tc* basis.
  2. Higher collateral valuation (relative to firm's capital) implies a higher share of total costs financed via *tc*.
  3. Both effects seem to be higher for FCF.
- Firms' debt structure results:
  4. Higher collateral valuation (relative to firm's capital) implies a higher level of short-term borrowings, including short-term bank credit.
  5. Higher collateral valuation (relative to firm's capital) implies a higher level of issuance and repayment of long-term borrowings.

THANK YOU.

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Appendix

Main variables

Variable	Definition	Source
Accounts receivable ($ar_{i,t}$)	Amount of open accounts, net of applicable reserves, owed by customers for goods and services sold in the ordinary course of business.	"RECTR" or item No. 151 of C.
Accounts payable ($ap_{i,t}$)	Trade obligations due within one year or the normal operating cycle of the company.	"AP" or item No. 70 of C.
Log of net sales ($size_{i,t}$)	Gross sales reduced by cash discounts, trade discounts, and returned sales and allowances for which credit is given to customers.	"SALE" or item No. 12 of C.
Cash flow from operations ($cash_{i,t}$)	Summation of income before extraordinary items (IBEI) and depreciation and amortization (DA) scaled by total adjusted assets.	IBEI is "IB" or item No. 18 of C. DA is "DP" or item No. 14 of C.
Total long-term debt ($debt_{i,t}$)	Debt obligations due more than one year from the company's balance sheet date scaled by total adjusted assets.	"DLTT" or item No. 9 of C.
Total inventories ($inventories_{i,t}$)	Merchandise bought for resale and materials and supplies purchased for use in revenue production scaled by total adjusted assets. It includes finished goods, raw materials, work in progress, among others.	"INVT" or item No. 3 of C.
Old firm ($old_{i,t}$)	Dummy equal to one if the firm is old, and zero otherwise. The firm is old if its age is higher or equal to the median value observed in the sample. Age is measured as the number of years since the IPO date.	IPO date is "IPODATE" of C.
Local housing supply elasticity ($supply\ elasticity_l$)	Estimated from a nonlinear model based on physical and regulatory constraints, including processing satellite-generated data on elevation and the presence of water bodies, and predetermined population levels in the year 2000. Includes 95 different MSAs and capture the amount of developable land in each of these MSAs.	Saiz (2010).
Long-term interest rate (r_t^{USA})	Contract rate on 30-years conventional home mortgage. Annual values are obtained as a simple average of monthly values.	Variable "30-Year Conventional Mortgage Rate" published by the FED.

Table 4: Descriptive statistics of main variables[a].

Variable	Mean	Median	Std. Dev.	Min	Max	Obs.
Accounts receivable: $ar_{i,t}$	85.07	13.50	140.42	0.00	448.91	31,576
Accounts payable: $ap_{i,t}$	50.31	7.58	83.09	0.00	258.44	32,213
Net accounts receivable: $nar_{i,t}$	25.00	3.99	65.60	-164.31	172.28	31,574
Share of accounts receivable: $(ar/sales)_{i,t}$	0.17	0.15	0.15	0.00	0.82	27,236
Share of accounts payable: $(ap/costs)_{i,t}$	0.17	0.12	0.16	0.00	0.72	27,867
Real estate value using state-level prices: $REval_{i,t}^{state}$	120.27	1.08	209.07	0.00	604.10	32,508
Real estate value using MSA-level prices: $REval_{i,t}^{msa}$	83.10	0.00	143.58	0.00	407.05	19,186
Adjusted real estate value using state-level prices: $RE_{i,t}^{state}$	0.72	0.06	1.19	0.00	4.80	28,134
Adjusted real estate value using MSA-level prices: $RE_{i,t}^{msa}$	0.67	0.00	1.15	0.00	4.37	17,126
Log of net sales: $size_{i,t}$	4.84	4.88	2.68	-6.91	13.12	31,079
Cash flow from operations: $cash_{i,t}$	-0.01	0.09	0.32	-0.99	1.13	31,050
Adjusted total long-term debt: $debt_{i,t}$	0.22	0.13	0.29	0.00	1.94	31,088
Adjusted total inventories: $inventories_{i,t}$	0.18	0.14	0.19	0.00	1.00	30,972
Adjusted notes payable: $(notes\ pay)_{i,t}$	0.19	0.00	0.48	0.00	1.93	28,007
Adjusted long-term debt issuance: $(debt\ iss)_{i,t}$	0.56	0.00	1.19	0.00	4.66	26,908
Adjusted long-term debt repayment: $(debt\ rep)_{i,t}$	0.39	0.08	0.72	0.00	2.85	27,366
Adjusted long-term debt net change: $(debt\ cha)_{i,t}$	0.10	0.00	0.52	-0.65	1.86	26,352

[a] The statistics are computed for all the firms in the sample used in baseline regressions. This sample considers more than 2,500 unique firms with observations over the period between the years 1993 and 2018, excluding 2008. It includes firms whose headquarters are located in the United States, and excludes firms operating in the industries of finance, insurance, real estate, utilities, and those who are unclassified, as well as firms involved in a major takeover operation. I require firms to appear at least three consecutive years, and I keep only firms that have available data every consecutive year they appear in the sample. To prevent outliers distorting the results, all variables are winsorized at the median plus/minus five times the interquartile range. Since the interquartile range of debt-related ratios is close to zero, they are winsorized using the fifth and ninety-fifth percentiles as thresholds.

Table 5: Comparison of main variables between two different samples[a].

Variable	Baseline sample			Compustat North America		
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
Accounts receivable: $ar_{i,t}$	97.73	15.37	161.94	108.03	17.01	179.31
Accounts payable: $ap_{i,t}$	61.86	9.86	102.05	73.53	10.65	122.05
Net accounts receivable: $nar_{i,t}$	26.12	3.96	71.65	20.98	2.57	66.92
Net sales or SALE in Compustat	950.30	163.60	1,556.43	1,011.16	167.53	1,672.51
Total assets or AT in Compustat	859.73	135.82	1,407.18	1,202.29	180.55	1,993.71
Total long-term debt or DLTT in Compustat	190.06	8.78	331.31	289.48	11.76	502.89
Total inventories or INVT in Compustat	94.57	13.51	158.05	85.88	10.84	144.69
Total current debt change or DLCCH in Compustat	0.00	0.00	2.65	0.06	0.00	3.16
Notes payable or NP in Compustat	1.72	0.00	3.06	3.11	0.00	5.49
Total long-term debt issuance or DLTIS in Compustat	35.60	0.22	62.18	62.30	0.50	108.99
Total long-term debt repayment or DLTR in Compustat	35.38	1.76	60.93	52.49	1.86	91.00
Age	10.04	8.00	7.60	8.65	7.00	8.15

[a] The statistics in the section "Baseline sample" are computed considering all the firms in the sample used for the set of baseline regressions. The statistics in the section "Compustat North America" are computed using all the firms in the original Compustat North America database, excluding firms operating in the industries of finance, insurance, real estate, utilities, and those who are unclassified, and considering only observations over the period between the years 1993 and 2018, excluding 2008. To prevent outliers distorting the results, all variables are winsorized at the median plus/minus five times the interquartile range.

Table 6: Pooled OLS using MSA-level prices (1993-2018)[a].

	$(ar/sales)_{i,t}$	$(ap/costs)_{i,t}$	$(nar/sales)_{i,t}$	$(notes\ pay)_{i,t}$	$(debt\ iss)_{i,t}$	$(debt\ rep)_{i,t}$	$(debt\ cha)_{i,t}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$RE^{msa}_{i,t}$	0.011***	0.006**	0.008***	0.018**	0.023	0.035**	-0.001
	(0.002)	(0.002)	(0.002)	(0.007)	(0.026)	(0.014)	(0.013)
$size_{i,t-1}$	0.045***	0.030***	0.018***	0.007	0.004	0.031***	-0.021*
	(0.004)	(0.003)	(0.004)	(0.008)	(0.024)	(0.012)	(0.012)
$cash_{i,t-1}$	-0.004	-0.001	0.017**	-0.083***	-0.068	-0.009	-0.011
	(0.007)	(0.007)	(0.007)	(0.026)	(0.066)	(0.036)	(0.032)
$debt_{i,t-1}$	0.005	-0.006	-0.006	0.019	-0.064	0.429***	-0.233***
	(0.007)	(0.007)	(0.008)	(0.023)	(0.082)	(0.047)	(0.042)
$inventories_{i,t-1}$	0.042***	0.063***	-0.007	0.282***	0.734***	0.073	0.161*
	(0.016)	(0.015)	(0.017)	(0.064)	(0.178)	(0.093)	(0.085)
$old_{i,t}$	0.050	0.015	-0.058*	0.047	-0.121	-0.107	-0.023
	(0.038)	(0.038)	(0.030)	(0.064)	(0.301)	(0.091)	(0.128)
Fixed-effects							
- firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- industry ## year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R.E. prices	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lagged dependent variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Init. controls # R.E. prices	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,022	13,042	13,022	13,038	12,177	12,565	11,835
Adjusted R^2	0.545	0.610	0.621	0.522	0.267	0.399	0.0774
Firms	1,688	1,688	1,688	1,681	1,676	1,679	1,667

[a] Standard errors are reported in parenthesis, clustered at MSA-year level. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Fixed-effects, real estate prices, the lagged value of the dependent variable, and the interaction between initial controls and real estate prices are included but not reported.

Table 7: First-stage of the two-stage least square regression (1993-2018)[a].

	MSA residential prices	
	(1)	(2)
r_t	-0.272***	-0.266***
	(0.007)	(0.007)
$(supply\ elasticity)_l \times r_t$	0.017***	
	(0.003)	
$Q_2(supply\ elasticity)_l \times r_t$		0.015*
		(0.008)
$Q_3(supply\ elasticity)_l \times r_t$		0.032***
		(0.007)
$Q_4(supply\ elasticity)_l \times r_t$		0.038***
		(0.006)
Fixed-effects		
- MSA	Yes	Yes
- year	Yes	Yes
Observations	2,136	2,136
Adjusted R^2	0.853	0.854
MSAs	88	88
F-stat on excluded instruments	1,196.03	645.59
P-value of F-stat	0	0

[a] Standard errors are reported in parenthesis, clustered at MSA-level. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Fixed-effects are included but not reported. While column (1) uses a simple interaction between local housing supply elasticity and the long-term interest rate, column (2) replaces this variable with a set of dummies denoting quartiles of the distribution of local housing supply elasticity. $Q_k(supply\ elasticity)_l$ denotes a dummy variable that identify whether the elasticity of location l is in the quartile k of the distribution of housing supply elasticity across MSAs.

Table 8: Pooled OLS using the first instrument (1993-2018)[a].

	$(ar/sales)_{i,t}$	$(ap/costs)_{i,t}$	$(nar/sales)_{i,t}$	$(notes\ pay)_{i,t}$	$(debt\ iss)_{i,t}$	$(debt\ rep)_{i,t}$	$(debt\ cha)_{i,t}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$Instrument^{1,msa}_{i,t}$	0.012***	0.007**	0.009***	0.029***	0.018	0.035**	-0.000
	(0.003)	(0.003)	(0.003)	(0.009)	(0.032)	(0.017)	(0.017)
$size_{i,t-1}$	0.046***	0.032***	0.022***	0.007	0.001	0.033***	-0.019
	(0.004)	(0.003)	(0.004)	(0.009)	(0.028)	(0.012)	(0.013)
$cash_{i,t-1}$	-0.008	-0.003	0.018**	-0.073***	-0.044	-0.008	0.001
	(0.007)	(0.008)	(0.008)	(0.026)	(0.073)	(0.041)	(0.033)
$debt_{i,t-1}$	0.007	-0.004	-0.006	0.018	-0.063	0.388***	-0.213***
	(0.008)	(0.007)	(0.008)	(0.026)	(0.084)	(0.047)	(0.049)
$inventories_{i,t-1}$	0.043**	0.067***	-0.006	0.275***	0.825***	0.092	0.149
	(0.018)	(0.016)	(0.018)	(0.068)	(0.185)	(0.089)	(0.093)
$old_{i,t}$	0.022	-0.012	-0.047*	0.055	-0.243	-0.138	-0.035
	(0.039)	(0.039)	(0.026)	(0.062)	(0.212)	(0.094)	(0.111)
Fixed-effects							
- firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- industry ## year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R.E. prices	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lagged dependent variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Init. controls # R.E. prices	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,039	11,061	11,039	11,054	10,310	10,653	10,022
Adjusted R^2	0.529	0.606	0.619	0.517	0.258	0.389	0.0786
Firms	1,480	1,480	1,480	1,473	1,467	1,477	1,461

[a] Standard errors are reported in parenthesis, clustered at MSA-year level. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Fixed-effects, real estate prices, the lagged value of the dependent variable, and the interaction between initial controls and real estate prices are included but not reported.

Table 9: Pooled OLS using the second instrument (1993-2018)[a].

	$(ar/sales)_{i,t}$	$(ap/costs)_{i,t}$	$(nar/sales)_{i,t}$	$(notes\ pay)_{i,t}$	$(debt\ iss)_{i,t}$	$(debt\ rep)_{i,t}$	$(debt\ cha)_{i,t}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$Instrument^{2,msa}_{i,t}$	0.012***	0.006**	0.009***	0.029***	0.022	0.038**	-0.000
	(0.003)	(0.003)	(0.003)	(0.009)	(0.032)	(0.017)	(0.016)
$size_{i,t-1}$	0.046***	0.032***	0.022***	0.007	-0.002	0.034***	-0.022
	(0.004)	(0.003)	(0.004)	(0.009)	(0.027)	(0.012)	(0.014)
$cash_{i,t-1}$	-0.008	-0.003	0.018**	-0.072***	-0.046	-0.008	-0.000
	(0.008)	(0.007)	(0.008)	(0.027)	(0.072)	(0.039)	(0.035)
$debt_{i,t-1}$	0.007	-0.004	-0.006	0.017	-0.067	0.389***	-0.216***
	(0.008)	(0.007)	(0.009)	(0.024)	(0.089)	(0.051)	(0.046)
$inventories_{i,t-1}$	0.043**	0.064***	-0.006	0.276***	0.814***	0.098	0.139
	(0.018)	(0.017)	(0.019)	(0.068)	(0.193)	(0.099)	(0.091)
$old_{i,t}$	0.023	-0.012	-0.047*	0.048	-0.234	-0.133	-0.040
	(0.039)	(0.039)	(0.026)	(0.061)	(0.209)	(0.091)	(0.107)
Fixed-effects							
- firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- industry ## year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R.E. prices	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lagged dependent variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Init. controls # R.E. prices	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,039	11,061	11,039	11,054	10,310	10,653	10,022
Adjusted R^2	0.529	0.605	0.619	0.517	0.259	0.389	0.0797
Firms	1,480	1,480	1,480	1,473	1,467	1,477	1,461

[a] Standard errors are reported in parenthesis, clustered at MSA-year level. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Fixed-effects, real estate prices, the lagged value of the dependent variable, and the interaction between initial controls and real estate prices are included but not reported.

Table 10: Pooled OLS using the sample of firms operating in the manufacturing sector (1993-2018)[a].

	$(ar/sales)_{i,t}$	$(ap/costs)_{i,t}$	$(nar/sales)_{i,t}$	$(notes\ pay)_{i,t}$	$(debt\ iss)_{i,t}$	$(debt\ rep)_{i,t}$	$(debt\ cha)_{i,t}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$RE^{state}_{i,t}$	0.010***	0.004*	0.010***	0.017***	0.036*	0.039***	0.002
	(0.002)	(0.002)	(0.002)	(0.006)	(0.021)	(0.012)	(0.012)
$size_{i,t-1}$	0.045***	0.027***	0.028***	-0.003	0.003	0.033***	-0.025**
	(0.004)	(0.003)	(0.004)	(0.009)	(0.022)	(0.011)	(0.011)
$cash_{i,t-1}$	-0.014*	-0.005	0.024***	-0.084***	-0.068	-0.044	0.007
	(0.007)	(0.007)	(0.008)	(0.027)	(0.063)	(0.039)	(0.031)
$debt_{i,t-1}$	-0.001	-0.008	0.001	0.032	-0.068	0.313***	-0.180***
	(0.007)	(0.007)	(0.008)	(0.025)	(0.091)	(0.045)	(0.052)
$inventories_{i,t-1}$	0.030**	0.073***	0.015	0.220***	0.369**	-0.034	0.088
	(0.015)	(0.016)	(0.017)	(0.056)	(0.161)	(0.085)	(0.084)
$old_{i,t}$	0.056	0.016	-0.067**	0.064	-0.136	-0.131	0.008
	(0.039)	(0.038)	(0.030)	(0.063)	(0.304)	(0.095)	(0.134)
Fixed-effects							
- firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- industry ## year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R.E. prices	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lagged dependent variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Init. controls # R.E. prices	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12,507	12,527	12,506	12,543	11,679	12,059	11,359
Adjusted R^2	0.517	0.633	0.626	0.595	0.348	0.450	0.196
Firms	1,503	1,503	1,503	1,504	1,481	1,487	1,467

[a] Standard errors are reported in parenthesis, clustered at state-year level when state-level prices are used to construct the main independent variable, and at MSA-year level when MSA-level prices are used to construct the main independent variable. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Fixed-effects, real estate prices, the lagged value of the dependent variable, and the interaction between initial controls and real estate prices are included but not reported. Following Mian and Sufi (2014), manufacturing sector serves as a proxy of tradable output. Manufacturing industries are those with SIC2 codes in the range of codes 20 and 39.

Table 11: Pooled PPML using the sample of small firms with headquarters located in large MSA (1993-2018)[a].

	$(ar/sales)_{i,t}$	$(ap/costs)_{i,t}$	$(nar/sales)_{i,t}$	$(notes\ pay)_{i,t}$	$(debt\ iss)_{i,t}$	$(debt\ rep)_{i,t}$	$(debt\ cha)_{i,t}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$RE^{state}_{i,t}$	0.028***	0.013*	-0.003	0.058***	-0.007	0.043	-0.033
	(0.006)	(0.007)	(0.006)	(0.021)	(0.057)	(0.035)	(0.032)
$size_{i,t-1}$	0.049***	0.031***	0.027***	0.020	0.033	0.046***	-0.009
	(0.006)	(0.005)	(0.005)	(0.014)	(0.043)	(0.016)	(0.020)
$cash_{i,t-1}$	0.003	0.022*	0.010	-0.109***	-0.216**	-0.048	-0.065
	(0.010)	(0.011)	(0.010)	(0.039)	(0.110)	(0.066)	(0.047)
$debt_{i,t-1}$	0.001	-0.022*	-0.002	0.027	0.093	0.436***	-0.146**
	(0.012)	(0.011)	(0.014)	(0.037)	(0.139)	(0.077)	(0.072)
$inventories_{i,t-1}$	0.069**	0.067**	-0.003	0.177*	0.847***	-0.017	0.182
	(0.027)	(0.028)	(0.029)	(0.102)	(0.323)	(0.155)	(0.156)
$old_{i,t}$	0.101	0.046	-0.121**	0.063	-0.398	-0.179	-0.177
	(0.064)	(0.068)	(0.050)	(0.098)	(0.383)	(0.179)	(0.173)
Fixed-effects							
- firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- industry ## year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R.E. prices	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lagged dependent variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Init. controls # R.E. prices	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,205	4,212	4,205	4,219	3,919	4,022	3,787
Adjusted R^2	0.545	0.617	0.674	0.601	0.420	0.506	0.273
Firms	718	718	718	717	695	700	687

[a] Standard errors are reported in parenthesis, clustered at state-year level when state-level prices are used to construct the main independent variable, and at MSA-year level when MSA-level prices are used to construct the main independent variable. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Fixed-effects, real estate prices, the lagged value of the dependent variable, and the interaction between initial controls and real estate prices are included but not reported. Small firms are those in the bottom three quartiles of firms' total assets distribution. A large MSA is defined as anyone on the top 20 largest MSAs in terms of population size according to the 2000 Census.

Table 12: Pooled OLS using samples from three different sub-periods[a].

	Share of accounts receivable				Share of accounts payable			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$RE^{state}_{i,t}$	0.011***	0.001	0.011***	0.011***	0.007**	-0.004	0.007***	0.006***
	(0.002)	(0.006)	(0.002)	(0.002)	(0.003)	(0.006)	(0.002)	(0.002)
$size_{i,t-1}$	0.066***	0.073***	0.050***	0.047***	0.050***	0.026**	0.036***	0.034***
	(0.007)	(0.015)	(0.005)	(0.003)	(0.006)	(0.018)	(0.005)	(0.003)
$cash_{i,t-1}$	-0.010	0.040**	-0.004	-0.008	-0.009	0.022	0.003	-0.001
	(0.005)	(0.014)	(0.003)	(0.006)	(0.004)	(0.011)	(0.003)	(0.006)
$debt_{i,t-1}$	0.011	0.020	0.004	0.000	0.011	-0.023	0.002	-0.002
	(0.007)	(0.018)	(0.007)	(0.005)	(0.008)	(0.015)	(0.007)	(0.005)
$inventories_{i,t-1}$	0.039*	-0.031	0.026	0.036***	0.078***	0.028	0.059***	0.071***
	(0.008)	(0.013)	(0.006)	(0.014)	(0.007)	(0.019)	(0.006)	(0.013)
$old_{i,t}$	0.002	0.002	-0.004	0.049	0.006	0.006	0.003	0.006
	(0.006)	(0.006)	(0.005)	(0.038)	(0.004)	(0.004)	(0.004)	(0.038)
Fixed-effects								
- firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- industry ## year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R.E. prices	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lagged dependent variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Init. controls # R.E. prices	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12,667	3,320	16,030	20,369	12,686	3,327	16,056	20,401
Adjusted R^2	0.589	0.667	0.576	0.569	0.633	0.754	0.632	0.617
Firms	2,109	780	2,384	2,824	2,110	781	2,385	2,824
Years	(1997-2007)	(2009-2018)	(1997-2018)	(1993-2018)	(1997-2007)	(2009-2018)	(1997-2018)	(1993-2018)

[a] Standard errors are reported in parenthesis, clustered at state-year level when state-level prices are used to construct the main independent variable, and at MSA-year level when MSA-level prices are used to construct the main independent variable. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Fixed-effects, real estate prices, the lagged value of the dependent variable, and the interaction between initial controls and real estate prices are included but not reported.

Table 13: Pooled OLS with samples of constrained and unconstrained firms using the first definition (1993-2018)[a].

	Share of accounts receivable $(ar/sales)_{i,t}$				Share of accounts payable $(ap/costs)_{i,t}$			
	Unconstrained (1)	Constrained (2)	Unconstrained (3)	Constrained (4)	Unconstrained (5)	Constrained (6)	Unconstrained (7)	Constrained (8)
$RE^{state}_{i,t}$	0.014***	0.012***			0.001	0.012***		
	(0.003)	(0.004)			(0.003)	(0.004)		
$RE^{msa}_{i,t}$			0.013***	0.015***			-0.002	0.013***
			(0.004)	(0.005)			(0.005)	(0.005)
$size_{i,t-1}$	0.055***	0.054***	0.061***	0.052***	0.034***	0.041***	0.033***	0.037***
	(0.006)	(0.005)	(0.007)	(0.005)	(0.004)	(0.004)	(0.006)	(0.005)
$cash_{i,t-1}$	0.001	-0.017**	-0.011	-0.006	-0.021	0.001	-0.027	0.000
	(0.014)	(0.008)	(0.017)	(0.009)	(0.017)	(0.008)	(0.020)	(0.009)
$debt_{i,t-1}$	0.016	0.006	0.013	0.019*	-0.007	0.004	-0.008	-0.000
	(0.011)	(0.008)	(0.012)	(0.011)	(0.013)	(0.007)	(0.019)	(0.010)
$inventories_{i,t-1}$	0.038	0.025	0.050	0.047*	0.046*	0.077***	0.064*	0.066***
	(0.028)	(0.021)	(0.034)	(0.025)	(0.028)	(0.018)	(0.035)	(0.023)
$old_{i,t}$	-0.003	0.095	0.007	0.099	-0.033	0.113	-0.022	0.126
	(0.016)	(0.074)	(0.015)	(0.071)	(0.022)	(0.081)	(0.028)	(0.077)
Fixed-effects								
- firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- industry ## year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R.E. prices	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lagged dependent variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Init. controls # R.E. prices	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,405	7,932	4,546	5,204	7,416	7,942	4,551	5,212
Pseudo R^2	0.689	0.477	0.668	0.446	0.700	0.562	0.701	0.562
Firms	1,796	1,823	1,125	1,086	1,794	1,825	1,124	1,086

[a] Standard errors are reported in parenthesis, clustered at state-year level when state-level prices are used to construct the main independent variable, and at MSA-year level when MSA-level prices are used to construct the main independent variable. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Fixed-effects, real estate prices, the lagged value of the dependent variable, and the interaction between initial controls and real estate prices are included but not reported. According to the first definition of ex-ante credit constraint, constrained firms are those in the bottom three deciles of the dividend payout distribution for every year. Unconstrained firms are those in the top three deciles of the dividend payout distribution for every year.

Table 14: Pooled OLS with samples of constrained and unconstrained firms using the second definition (1993-2018)[a].

	Share of accounts receivable $(ar/sales)_{i,t}$				Share of accounts payable $(ap/costs)_{i,t}$			
	Unconstrained (1)	Constrained (2)	Unconstrained (3)	Constrained (4)	Unconstrained (5)	Constrained (6)	Unconstrained (7)	Constrained (8)
$RE^{state}_{i,t}$	0.009***	0.007			0.004	0.011*		
	(0.003)	(0.005)			(0.003)	(0.006)		
$RE^{msa}_{i,t}$			0.010***	0.016***			0.004	0.009
			(0.003)	(0.006)			(0.005)	(0.007)
$size_{i,t-1}$	0.053***	0.050***	0.061***	0.047***	0.044***	0.040***	0.042***	0.033***
	(0.005)	(0.005)	(0.007)	(0.006)	(0.007)	(0.004)	(0.009)	(0.005)
$cash_{i,t-1}$	-0.007	-0.004	0.004	0.001	-0.057***	0.022***	-0.040*	0.012
	(0.013)	(0.008)	(0.018)	(0.009)	(0.016)	(0.008)	(0.023)	(0.009)
$debt_{i,t-1}$	-0.001	-0.000	0.005	0.003	0.001	-0.017*	-0.011	-0.026**
	(0.008)	(0.009)	(0.011)	(0.012)	(0.007)	(0.010)	(0.011)	(0.012)
$inventories_{i,t-1}$	0.007	0.032	-0.028	0.036	0.075***	0.081***	0.046	0.073***
	(0.023)	(0.023)	(0.026)	(0.025)	(0.022)	(0.020)	(0.031)	(0.026)
$old_{i,t}$	0.063	0.277***	0.060	0.221**	0.022	0.097	0.034	0.088
	(0.066)	(0.091)	(0.066)	(0.090)	(0.071)	(0.095)	(0.079)	(0.099)
Fixed-effects								
- firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- industry ## year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R.E. prices	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lagged dependent variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Init. controls # R.E. prices	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,625	5,161	3,471	3,665	6,642	5,168	3,478	3,674
Pseudo R^2	0.782	0.361	0.782	0.385	0.753	0.557	0.761	0.563
Firms	1,428	1,065	812	686	1,429	1,066	813	686

[a] Standard errors are reported in parenthesis, clustered at state-year level when state-level prices are used to construct the main independent variable, and at MSA-year level when MSA-level prices are used to construct the main independent variable. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Fixed-effects, real estate prices, the lagged value of the dependent variable, and the interaction between initial controls and real estate prices are included but not reported. According to the second definition of ex-ante credit constraint, constrained firms are those in the bottom three deciles of the total assets' distribution for every year. Unconstrained firms are those in the top three deciles of total assets' distribution for every year.

Table 15: Pooled OLS with samples of constrained and unconstrained firms using the third definition (1993-2018)[a].

	Share of accounts receivable $(ar/sales)_{i,t}$				Share of accounts payable $(ap/costs)_{i,t}$			
	Unconstrained (1)	Constrained (2)	Unconstrained (3)	Constrained (4)	Unconstrained (5)	Constrained (6)	Unconstrained (7)	Constrained (8)
$RE^{state}_{i,t}$	0.010***	0.013**			0.003	0.018***		
	(0.002)	(0.005)			(0.002)	(0.006)		
$RE^{msa}_{i,t}$			0.012***	0.029***			0.003	0.037***
			(0.003)	(0.010)			(0.003)	(0.009)
$size_{i,t-1}$	0.042***	0.102***	0.045***	0.098***	0.026***	0.081***	0.028***	0.093***
	(0.004)	(0.010)	(0.004)	(0.016)	(0.003)	(0.010)	(0.004)	(0.011)
$cash_{i,t-1}$	-0.021**	-0.002	-0.020**	-0.003	-0.003	-0.019	-0.001	-0.019
	(0.009)	(0.013)	(0.010)	(0.018)	(0.009)	(0.014)	(0.010)	(0.020)
$debt_{i,t-1}$	0.007	0.022*	0.013	0.025	-0.000	0.020*	0.003	0.008
	(0.007)	(0.012)	(0.009)	(0.021)	(0.006)	(0.012)	(0.008)	(0.019)
$inventories_{i,t-1}$	0.032	0.030	0.047**	0.038	0.067***	0.082**	0.066***	0.104
	(0.019)	(0.043)	(0.024)	(0.069)	(0.017)	(0.041)	(0.020)	(0.066)
$old_{i,t}$	0.012		0.015		-0.008		0.002	
	(0.026)		(0.026)		(0.026)		(0.028)	
Fixed-effects								
- firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- industry ## year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R.E. prices	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lagged dependent variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Init. controls # R.E. prices	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,909	3,933	8,323	1,320	11,933	3,939	8,337	1,324
Pseudo R^2	0.623	0.611	0.601	0.496	0.650	0.624	0.638	0.620
Firms	1,722	1,171	1,357	405	1,723	1,172	1,359	406

[a] Standard errors are reported in parenthesis, clustered at state-year level when state-level prices are used to construct the main independent variable, and at MSA-year level when MSA-level prices are used to construct the main independent variable. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Fixed-effects, real estate prices, the lagged value of the dependent variable, and the interaction between initial controls and real estate prices are included but not reported. According to the third definition of ex-ante credit constraint, unconstrained firms are those with long-term debt outstanding and bonds rated by Standard and Poor's company. Constrained firms are those without a bond rating.

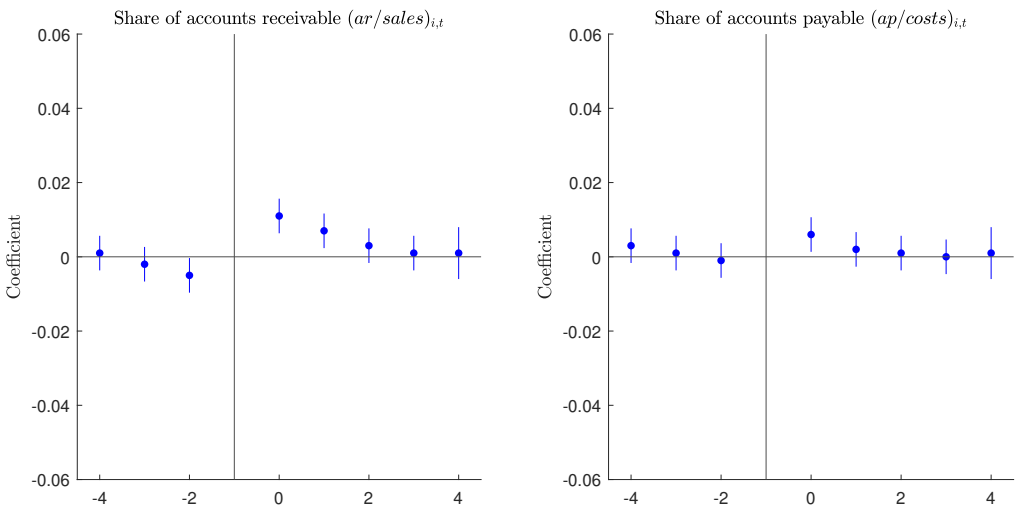

Figure 1: Estimated coefficient of different lagged/forward values of the dependent variable using MSA-level prices.

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