Counterparty Risk: Implications for Network Linkages and Asset Prices

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The Motivating Fact

- Firms' sales: some in cash, rest in trade credit (logged as receivables)
- Research question:
  - How does trade credit (TC) impact firms' systematic risk?
  - What are the asset pricing implications of TC?

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  - What are the asset pricing implications of TC?
- Novel Fact I:

  Firms with higher receivables to sales (R/S) have lower expected returns

  - Spread between low and high R/S firms is 7.1% p.a.
  - Termed as *"counterparty premium"*

Counterparty Premium: A Puzzle?

- Logic I: the naive view
  - TC increases supplier firms' systematic risks because customer firms default systematically during economic downturns
  - Days Receivables ($\propto$ R/S):
    - Commonly used to evaluate firms' operating risk by offering TC
    - Typical interpretation: Days Receivables $\uparrow \Rightarrow$ lower operating efficiency (e.g. Brigham & Houston 09)

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Logic II: the liquidity insurance view

- Why do firms offer more trade credit?
- **Puzzle: What source of risk makes low (high) R/S firms riskier (safer)?**
  - (a) Spread not explained by traditional asset pricing models
  - (b) Spread not explained by differences in Compustat characteristics
  - (c) Counterparty premium distinct from value, profitability, accruals, inventories
  - (d) Evidence for a new counterparty risk factor with negative risk premium

Supplier-Customer Link Duration and Trade Credit

- To resolve the puzzle, we explore granular production network data
- Novel Fact II:

  Duration of supplier-customer links relates to R/S and premia

  (a) Lower R/S $\Rightarrow$ lower expected duration links with customers
  (b) Low link duration firms earn 0.98% per month higher returns
  (c) R/S economically important for predicting dynamics of production network

  - Link duration premium subsumes R/S spread in a double sort

A Quantitative Model

- A production-based model with endogenous trade credit.
  - Suppliers are matched with customers with heterogeneous quality
  - Customer subject to idiosyncratic shocks that cause default and bankruptcy
  - Supplier can provide insurance to current customer by offering trade credit
  - Customer does not default: trade credit repaid; link with customer sustained
  - Customer defaults: credit lost; link breaks; supplier searches a new customer
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- Model-implied results:
  1. High R/S firms earn lower risk premium; Replicates counterparty premium
  2. Low R/S firms endogenously maintain low duration links with customers

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- **Intuition**:
  - Supplier has incentive to keep high quality customer going forward
  - R/S $\uparrow \Rightarrow$ insurance to customer $\uparrow \Rightarrow$ Pr(Default) $\downarrow$ and link duration $\uparrow$
  - High R/S $\Leftrightarrow$ avoid costly frictions in searching for new customer $\Rightarrow$ safer

Roadmap

- Empirical Evidence on Counterparty Risk Premium
- Trade Credit and Link Duration in Production Networks
- Model
- Theoretical Results
- Conclusion

Trade Counterpart Risk and Stock Returns

- Measure trade counterparty risk (R/S) of firm *i* at time *t* as:

$$R/S_{i,t} = \frac{\text{Account receivables}_{i,t}}{\text{Sales}_{i,t}}$$

- Sort firms into 3 portfolios in June based on publicly observable past R/S
  - Breakpoints 10^{th} and 90^{th} percentiles of R/S's distribution

	Value-weighted	Equal-weighted
Portfolio	Mean (% p.m.)	Mean (% p.m.)
Low R/S	1.185	1.191
Medium	1.062	1.286
High R/S	0.589	0.744
Spread	0.597	0.448
(L-H)	(2.95)	(2.28)

- Returns indicate that low R/S firms are riskier than high R/S firms
  - Value-weighted spread 0.597% per month ($\approx$ 7.1% p.a.)
  - Portfolio returns tend to decrease in R/S (almost monotonically)

Systematic Trade Counterparty Risk

- Project the counterparty premium on 5 sets of common asset-pricing factors

$$Spread_t = \alpha + \beta \mathbf{F}'_t + \varepsilon_t$$

	CAPM	FF3F	FF4F	FF5F	*q*-factor
α	0.798	0.775	0.684	0.585	0.498
	(4.07)	(3.97)	(3.57)	(3.06)	(2.55)

  - Economically large and statistically significant α in each case

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- Is the counterparty premium priced in the cross-section of returns?
  - Posit SDF takes form $M_t = 1 - \boldsymbol{b}'\boldsymbol{f}_t - b_{CPR} CPR_t$
  - $\boldsymbol{f}_t = (MKTRF, SMB, HML)'$ and CPR_t denotes the Counterparty factor
  - Estimate $(\boldsymbol{b}', b_{CPR})'$ via GMM with moment conditions $\mathbb{E}\left[M_t r^e_{i,t}\right] = 0$

	FF3F + CPR	
	25 portfolios	62 portfolios
b_{CPR}	-17.803	-5.331
$t(b_{CPR})$	(-4.08)	(-3.52)

- Counterparty factor priced with a negative risk premium

Trade credit in Production Networks

- What makes low R/S firms riskier? Characteristics... ‣ Altenative explanations...
  - Consider Compustat characteristics of R/S-sorted portfolios
    - (e.g., ΔAsset, ROA, Accruals, Cash)
  - For most characteristics: no observed differences
  - Fama Macbeth & Double sorts:
    - R/S predicts returns significantly controlling for related characteristics

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- Turn to production-network data to explore determinants of R/S spread
  - Use FactSet Revere Relationships database
- Network-related characteristics of R/S portfolios:

	Low (L)	Medium	High (H)	Diff(L-H)	t(Diff)
Centrality	0.31	0.44	0.42	-0.11	(-0.91)
Upstreamness	1.65	2.74	3.03	-1.38	(-15.34)
N(Customers)	3.46	13.77	17.58	-14.12	(-13.76)
Duration	39.60	46.69	47.98	-8.38	(-2.68)

  - Network centrality does not explain R/S spread (e.g., Ahern (2013))
  - Upstreamness not aligned with evidence from Gofman, Segal, and Wu (2019)
  - Low R/S firms have significantly fewer customers
  - High R/S suppliers retain customers for $\approx$ 1 year longer (going forward)

The Link Duration Premium

- Do network characteristics help explain the counterparty premium?
  - Construct portfolio sorts using each characteristic aligned with spread

Portfolio	Spread by Duration Mean (% p.m.)	Spread by Num. customers Mean (% p.m.)
Low (L)	2.005	0.946
Medium	0.860	0.914
High (H)	1.021	0.864
Spread (L-H)	0.984 (4.26)	0.082 (0.50)

  - Economically significant and novel link duration premium
  - Suppliers that maintain longer links with customers earn $\approx 1\%$ per month less

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  - Economically significant and novel link duration premium
  - Suppliers that maintain longer links with customers earn ≈ 1% per month less
- Examine if link duration explains R/S spread via conditional double sort:

	Low Duration	Medium	High Duration	
Low R/S	2.28	0.82	1.49	
Medium	1.97	0.84	0.98	
High R/S	1.30	0.83	1.02	
Spread	0.98	-0.02	0.47	Joint test
(L-H)	($p = 0.11$)	($p = 0.52$)	($p = 0.20$)	($p = 0.61$)

  - Controlling for link duration subsumes R/S spread
  - Important interaction between supplier-customer link duration and R/S

Predicting Supplier-Customer Link Duration

- Document how suppliers' policies impact network dynamics (link duration)
  - Implement regression analysis using FactSet and Compustat data
  - Estimate following Fama-MacBeth regressions:

$$D_{s,t} = \beta_{0,t} + \beta_{1,t} R/S_{s,t} + \beta_{2,t} \ln(\text{ME})_{s,t} + \beta_{3,t} I/K_{s,t} + \beta_{4,t} ROA_{s,t} + \varepsilon_{s,t}$$

  - $D_{s,t}$ either duration or indicator that supplier-customer link breaks

	Panel A: Future duration		Panel B: $\Pr(\text{Break} = 1)$	
Constant	55.62	56.70	0.58	0.57
	(11.49)	(11.38)	(23.32)	(25.76)
R/S	4.69	5.86	-0.09	-0.09
	(3.59)	(3.66)	(-3.11)	(-3.98)
SIZE		-2.20		-0.01
		(-5.15)		(-0.34)
I/K		-2.84		0.01
		(-1.94)		(0.88)
ROA		2.82		-0.04
		(3.61)		(-3.36)

  - Changes in R/S have economically largest impact on link duration
  - Trade credit provision impact the network links' dynamics
  - In sum: $R/S \uparrow \Rightarrow \Pr(\text{Break} = 1) \downarrow \Rightarrow$ Duration $\uparrow$ and returns $\downarrow$
    - Build quantitative investment-based asset-pricing model to explain facts

Model

- Production function over capital (K):

$$Y_{i,t} = (A_t C_{i,t})^{1-\alpha} K_{i,t}^{\alpha}$$

  - Aggregate productivity A_t follows random walk with drift
  - **Novel ingredient:** $C_{i,t}$ supplier-customer pair specific
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- Capital law of motion:

$$K_{i,t+1} = (1-\delta) K_{i,t} + I_{i,t}$$

- Capital adjustment costs:

$$\phi\left(I_{,t}, K_{i,t}\right) = b\left(\frac{I_{i,t}}{K_{i,t}} - \delta\right)^2$$

- Fixed operating cost of ξK_{it} incurred each period
  - Creates operating leverage

Counterparty and Trade Credit

- Customers may experience liquidity shocks and default with prob $\Gamma(r)$:

$$\Gamma\left(r_{i,t+1}\right) = \left(\bar{p} - \underline{p}\right)\left(1 - r_{i,t+1}\right)^{\lambda} + \underline{p}$$

  - $\left\{\bar{p}, \underline{p}\right\}$ are maximum and minimum default probabilities
  - $r_{i,t+1}$ is trade credit extended at t, to be repayed at $t+1$, scaled by sales
  - $r_{i,t+1} \uparrow \Rightarrow$ supplier provides liquidity to customer $\Rightarrow \Gamma\left(r_{i,t+1}\right) \downarrow$
  - λ controls how $\Gamma\left(r_{i,t+1}\right)$ changes with $r_{i,t+1}$

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- Supplier must search/match with new counterparty (customer)
  - New counterparty's quality drawn from i.i.d. pool:

$$C_{i,t+1} \sim \mathcal{N}\left(0, \sigma_c^2\right)$$

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$$C_{i,t+1} \sim \mathcal{N}\left(0, \sigma_c^2\right)$$

- Search/match involves a cost $\propto f_t$ at start of period $t+1$
  - $f_{t+1} = f_0 + \sigma_f \varepsilon_{t+1}^f$, where $\varepsilon_{t+1}^f \overset{i.i.d.}{\sim} \mathcal{N}(0,1) \perp A_t$.
  - Shock represents systematic counterparty risk in model
  - Fluctuations in cost of finding customers (e.g., firm entry, regulation,...)

SDF

- SDF:

$$M_{t,t+1} = \frac{\beta \exp\left(-\gamma_{a,t}\sigma_a\varepsilon^a_{t+1} - SGN \cdot \gamma_f \sigma_f \varepsilon^f_{t+1}\right)}{\mathbb{E}_t\left[\exp\left(-\gamma_{a,t}\sigma_a\varepsilon^a_{t+1} - SGN \cdot \gamma_f \sigma_f \varepsilon^f_{t+1}\right)\right]}$$

- Time-varying market price of productivity shocks as in habit-models

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- Time-varying market price of productivity shocks as in habit-models
- Market price of counterparty factor shocks:
  - SGN is the sign of the market price of risk for counterparty shocks ε^f
  - When $SGN = -1$, f shocks are negatively priced (in-line with data)
  - γ_f is the magnitude of rematching shocks' market price of risk

Calibration

- Model calibrated and solved at **annual** frequency
  - Many parameters standard and drawn from existing studies
- Three sets of parameters to highlight:

Parameter	Value	Description
Technology.		
σ_c	0.6	dispersion of counterparty quality
f_0	0.4	mean of matching cost
σ_f	0.1	standard deviation of matching cost
Liquidity.		
$\overline{p}$	0.5	Liquidity probability when $R/S = 0$
$\underline{p}$	0.25	Liquidity probability when $R/S \to \infty$
λ	10	Convexity of liquidity function
SDF.		
γ_f	7.6	magnitude (log) of price of risk for counterparty shocks
SGN	-1	negative risk price for counterparty shocks

- Note:
  - Rematching cost parameters tightly linked to firm-level R/S
  - Liquidity parameters associated with duration of supplier-customer links
  - SDF parameters consistent with empirical evidence on counterparty shocks

More...

Model's Fit for Aggregate and Firm-Level Moments

Moment	Data	Model
Panel A: Aggregate moments		
Agg. output growth mean	2.57	2.01
Agg. output growth stdev	4.17	2.23
Agg. output growth AC(1)	0.22	0.33
Equity premium mean	7.73	7.80
Equity premium stdev	15.46	15.66
Sharpe ratio	0.50	0.50
Panel B: Firm-level moments		
Firm-level R/S mean	23.15	20.14
Firm-level R/S stdev	9.33	10.18
Firm-level R/S AC(1)	0.49	0.45
Firm-level I/K stdev	13.40	14.29
Firm-level I/K AC(1)	0.48	0.19
Firm-level sales growth volatility	30.25	33.82
Firm-level operating profits/sales volatility	13.60	11.13

- Match more moments to data than free parameters

More...

- Model is **quantitatively reliable** regarding stock returns
  - Economically large equity risk premium

Model-implied R/S-sorted Portfolios

- How well does the model match the counterparty premium?
  - Recall we set liquidity parameters to target supplier-customer link duration:

Moment	Data	Model
Exp. link duration low R/S	3.30	3.03
Exp. link duration mid R/S	3.89	3.82
Exp. link duration high R/S	3.99	3.88

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- Form 3 portfolios based on previous period's R/S ratios

Moment	Data	Model
Avg. return low R/S	14.22	13.30
Avg. return mid R/S	12.74	10.38
Avg. return high R/S	7.07	8.53
R/S spread	7.16	4.77

  - Model-implied counterparty premium consistent with data
  - Note: No parameters target returns of R/S portfolios

Model Intuition: R/S Spread

- Low R/S firms more adversely affected by $f \uparrow$ (increases to rematching cost)
  - Low R/S firms provide small (or no) hedge to low quality customers $\Rightarrow$
  - Less likely to retain the same customer next period $\Rightarrow$
  - More likely to pay f next period $\Rightarrow$
  - More sensitive to search shocks ε_f ; $\beta_f^{R/S=LOW} < \beta_f^{R/S=HIGH} < 0$

More...

- Low R/S firms have more operating leverage that high R/S firms
  - All firms required to pay $\xi K_{i,t}$ each period
  - Low R/S endogenously matched to low quality customers $\Rightarrow$
  - Ceteris paribus, output of low R/S firms $<$ output of high R/S firms $\Rightarrow$
  - Degree of operating leverage higher for low R/S firms $\Rightarrow$
  - More sensitive to ε_a shocks; $0 < \beta_a^{R/S=HIGH} < \beta_a^{R/S=LOW}$

Collectively, counterparty premium is:

$$Premium = \underbrace{\left(\beta_f^{R/S=LOW} - \beta_f^{R/S=HIGH}\right)}_{\text{(-)}} \underbrace{\gamma_f}_{(-)} \sigma_f^2 + \underbrace{\left(\beta_a^{R/S=LOW} - \beta_a^{R/S=HIGH}\right)}_{(+)} \underbrace{\gamma_{a,t}}_{(+)} \sigma_a^2 > 0$$

- $\gamma_f < 0$ due to negative price of counterparty shocks (recall GMM results)
- $\gamma_{a,t} > 0$ due to positive price of aggregate productivity shocks

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Model Sensitivity

- How does counterparty premium change with leading model parameters?

Moment	(1) Data	(2) Benchmark	(3) $\gamma_f = 0$	(4) $SGN = 1$
Avg. return low R/S	14.22	13.30	5.106	4.268
Avg. return mid R/S	12.74	10.38	5.045	4.380
Avg. return high R/S	7.07	8.53	5.002	4.420
R/S spread	7.16	4.77	0.104	-0.152

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- Column (3): $\gamma_f = 0$
  - No rematching costs $\Rightarrow$ R/S $\approx$ 0.10% per annum
  - 98% of R/S spread explained by counterparty factor

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  - No rematching costs $\Rightarrow$ R/S $\approx$ 0.10% per annum
  - 98% of R/S spread explained by counterparty factor
- Column (4): $SGN = 1 \Rightarrow \gamma_f > 0$
  - Under the counterfactual $\gamma_f > 0$, spread expressed as

$$Premium \approx \underbrace{\left(\beta_f^{R/S=LOW} - \beta_f^{R/S=HIGH}\right)}_{(-)} \underbrace{\gamma_f}_{(+)} \sigma_f^2 \approx \text{-0.152\% per annum}$$

Interpretation of the Counterparty Risk Factor

- Counterparty risk is cost borne by supplier to match with customer
  - Shocks to cost have negative price of risk in SDF
  - Reduced-form; Captures search/match costs that vary cyclically

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  - Reduced-form; Captures search/match costs that vary cyclically

- Several ways cost may arise under GE with negative price of risk. Examples:
  (1) Search frictions $\uparrow$ if pool of potential customers $\downarrow$ (e.g., firm entry $\downarrow$)
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Interpretation of the Counterparty Risk Factor

- Counterparty risk is cost borne by supplier to match with customer
  - Shocks to cost have negative price of risk in SDF
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- Microfoundation for friction can arise from multiple sources (simultaneously)

Ruling Out Alternative Explanations

- Precautionary Savings:
  Risk$\uparrow$ $\Rightarrow$ Need for cash $\uparrow$ $\Rightarrow$ sell less (more) for credit (cash).
  - But no diff in cash holding
- Differential Lending Capacity:
  Less financially constrained firm $\Rightarrow$ safer + has more capacity to provide credit
  - But no diff in Hadlock-Pierce; Low R/S firms have lower leverage
- Investment-Trade Credit Tradeoff:
  Tradeoff between financing investment projects or providing credit $\Rightarrow$ If binding you give up projects, resulting in lower asset growth (risk) + less trade credit
  - But no diff in asset growth; Low R/S firms do not have more idio vol (proxy for growth options)
- Trade Credit As A Smoothing Device:
  Firms anticipate a drop in sales in bad times $\Rightarrow$ more trade credit creates a hedge (smoothing device for sales) because more cash collected in future bad states
  - But firms with high R/S have qualitatively higher future sales; No diff in investory growth (another smoothing mechanism)
- Ex-Ante Industry-Level Differences:
  If industries differ in trade credit reliance $\Rightarrow$ spread reflect ex-ante sectoral heterogeneity
  - But the R/S spread is positive and significant within most industries

▸ Characteristics... ▸ Within Industry Sort... ▸ back to network findings...

Robustness Checks

- Variation in the sample period ▸ More...
  - R/S spread $\sim$ 6.0% p.a. between 1996 - 2016
- Alternative breakpoints ▸ More...
  - R/S spread remains economically and statistically significant
- Examine the interaction between R/S and distress risk ▸ More...
  - R/S spread remains after controlling for O-Score
- Empirically verify key model assumption and implication ▸ More...
  (1) More productivity suppliers associated with more productive customers
  (2) Suppliers that offer more R/S associated with more productive customers
- Explore interaction between R/S and upstreamness ▸ More...
  - R/S spread significant across all layers of production network
- Within-industry evidence ▸ More...
  - R/S spread significant *within* many industries

Conclusion

- Empirically examine relation between trade counterparty risk and returns:
  - Contrary to common wisdom, high R/S firms have lower returns
  - Novel counterparty risk factor priced in cross-section of returns
  - Counterparty premium distinct from other spreads, explains accruals
  - R/S predicts duration of supplier-customer links
  - Low link duration premium in the data
- Include trade credit in a production-based model to reconcile the facts
- High R/S hedges supplier firm from frictions in search for new customer
- Future research:
  - Link search frictions to cohort of entrants?
  - Link search frictions to competition changes?
  - How do production network dynamics impact welfare?

Main Takeaways

- Asset pricing: New factor for the cross-section of equities
  What are stochastic (priced) costs of search?
  (1) A drop in the cohort of new entrants
  (2) An increase in competition among suppliers
  (3) Regulation changes for contracting
- Macro/Corp Fin: R/S is (one of the) best predictors for link duration
  (1) Info content of R/S is valuable; Links are hard to observe
  (2) "Persistence" of network depends on trade credit & affects valuations
- Accounting:
  (1) Counterparty premium subsumes the accruals premium puzzle (Sloan 96), and provides a microfoundation for it

Portfolio Characteristics

- Is R/S related to firm-level characteristics known to command risk premia?

	Low (L)	Medium	High (H)	Diff(L-H)	t(Diff)
R/S	0.02	0.14	0.50	-0.48	
ln(Size)	8.50	8.98	8.52	-0.02	(-0.14)
B/M	0.42	0.51	0.59	-0.07	(-1.57)
Cash / Assets	0.11	0.13	0.11	-0.01	(-0.81)
Leverage	0.23	0.21	0.34	-0.10	(-9.55)
Hadlock-Pierce	-3.91	-4.07	-4.00	0.08	(1.29)
Asset growth	0.16	0.13	0.14	0.01	(0.59)
IVOL	1.47	1.32	1.51	-0.04	(-0.43)
Cumulative future sales growth	0.32	0.23	0.42	-0.09	(-1.37)
Inventory growth	0.15	0.12	0.17	-0.02	(-0.46)
ROA	0.07	0.08	0.03	0.05	(7.59)
Momentum	0.23	0.21	0.18	0.02	(2.09)
Accruals	-0.04	-0.04	-0.03	-0.01	(-1.92)

- Statistically significant differences in momentum, profitability, and accruals
- MOM and profitability do not confound novelty of counterparty premium
  - Double-sort portfolios More...
  - Estimate firm-level Fama-MacBeth regressions More...
  - Counterparty premium survives
- Counterparty premium crowds out accruals More...

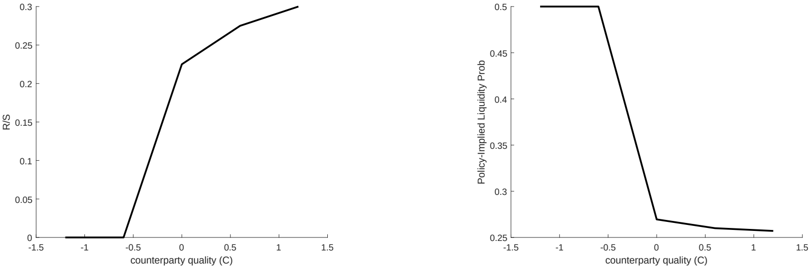
back to network findings... back to altenative explanations...

R/S Spread Within Industry Portfolios

Industry	Low R/S	Medium	High R/S	Spread	(L-H)
Nondurable	1.56	1.17	0.99	0.57	(2.44)
Energy	1.54	1.10	0.13	1.41	(3.20)
Telecommunication	1.42	1.01	0.38	1.05	(2.25)
High Tech	1.60	1.09	0.25	1.36	(4.39)
Health	1.50	1.20	0.68	0.82	(2.24)
Shops	1.12	1.22	1.04	0.09	(0.37)
Utilities	1.12	1.01	0.91	0.21	(0.58)
Durable	0.95	1.04	1.10	-0.15	(-0.42)
Manufacturing	0.81	1.07	0.95	-0.14	(-0.60)
				Joint test	($p < 0.01$)

back...

Model Intuition: R/S Spread and Duration Differences



- **Left Panel:** Supplier policy for extending trade credit
  - Positive and monotonic relation between R/S and customer quality ($C_{i,t}$)
  - $C_{i,t} \uparrow \Rightarrow$ Incentive to keep same (good quality) customer $\uparrow \Rightarrow R/S \uparrow$

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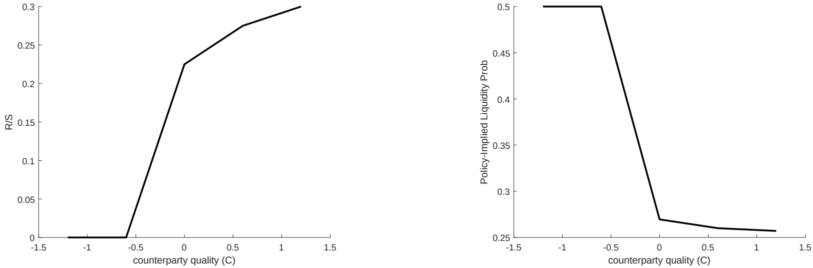

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  - $C_{i,t} \uparrow \Rightarrow$ Incentive to keep same (good quality) customer $\uparrow \Rightarrow R/S \uparrow$
- **Right Panel:** Customer liquidation probability
  - $C_{i,t} \uparrow \Rightarrow \Gamma(r_{i,t+1}) \downarrow$
  - Better customers face endogenously lower probability of default
  - Low $C_{i,t} \Rightarrow$ **no** trade credit; Supplier hopes for default to draw new customer
  - Trade credit is proxy for unobservable customer quality

Appendix: Profitability and Momentum

Panel A: Controlling for ROA				
	Low ROA	Medium	High ROA	
Low R/S	-0.17	1.20	1.28	
Medium	0.39	1.08	1.08	
High R/S	-1.23	0.75	0.66	
Spread	1.06	0.46	0.62	Joint test
(L-H)	($p = 0.01$)	($p = 0.01$)	($p = 0.02$)	($p = 0.01$)

Panel B: Controlling for momentum				
	Low MOM	Medium	High MOM	
Low R/S	1.28	1.16	1.52	
Medium	0.86	1.06	1.26	
High R/S	-0.08	0.68	0.68	
Spread	1.36	0.48	0.84	Joint test
(L-H)	($p = 0.00$)	($p = 0.01$)	($p = 0.01$)	($p = 0.00$)

Return

Appendix: Fama-MacBeth Regressions

	(1)	(2)	(3)	(4)	(5)	(6)
R/S	-1.66					-1.39
	(-2.24)					(-2.09)
ln(ME)		-3.45				-3.34
		(-2.31)				(-2.44)
B/M			3.30			2.01
			(4.45)			(3.62)
MOM				-0.73		-0.39
				(-0.58)		(-0.36)
ROA					1.25	1.96
					(1.38)	(2.25)
R^2	0.005	0.003	0.011	0.011	0.007	0.012

Return

Appendix: Counterparty Premium and Accruals

- Sloan (1996) shows that firms with lower accruals earn higher future returns
  - R/S is a component of accruals

(1) Does counterparty premium survive controlling for accruals?

(2) Does accruals effect survive controlling for R/S?

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  (2) Does accruals effect survive controlling for R/S?

- Answer both questions by double-sorting portfolios

Panel A: Controlling for accruals				
	Low Accruals	Medium	High Accruals	
Low R/S	1.19	1.24	0.94	
Medium	1.14	1.08	0.66	
High R/S	1.17	0.64	0.43	
Spread	0.02	0.61	0.51	Joint test
(L-H)	($p = 0.49$)	($p = 0.00$)	($p = 0.08$)	($p = 0.03$)
Panel B: Controlling for R/S				
	Low R/S	Medium	High R/S	
Low Accruals	1.47	1.16	0.73	
Medium	1.20	1.08	0.52	
High Accruals	1.06	0.74	0.19	
Spread	0.41	0.42	0.53	Joint test
(L-H)	($p = 0.19$)	($p = 0.03$)	($p = 0.11$)	($p = 0.19$)

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Panel A: Controlling for accruals				
	Low Accruals	Medium	High Accruals	
Low R/S	1.19	1.24	0.94	
Medium	1.14	1.08	0.66	
High R/S	1.17	0.64	0.43	
Spread	0.02	0.61	0.51	Joint test
(L-H)	($p = 0.49$)	($p = 0.00$)	($p = 0.08$)	($p = 0.03$)
Panel B: Controlling for R/S				
	Low R/S	Medium	High R/S	
Low Accruals	1.47	1.16	0.73	
Medium	1.20	1.08	0.52	
High Accruals	1.06	0.74	0.19	
Spread	0.41	0.42	0.53	Joint test
(L-H)	($p = 0.19$)	($p = 0.03$)	($p = 0.11$)	($p = 0.19$)

- R/S spread survives controlling for accruals; R/S crowds out accruals effect
  - Economic determinants of counterparty premium may explain accruals spread

Return

Appendix: Full Calibration

Parameter	Value	Description
Technology.		
μ_a	2%	aggregate productivity growth rate
σ_a	2.7%	aggregate productivity standard deviation
σ_c	0.6	dispersion of counterparty quality
f_0	0.4	mean of matching cost
σ_f	0.1	standard deviation of matching cost
Capital.		
δ	8%	Capital depreciation rate
α	0.4	Capital share of output
b	0.9	Quadratic adjustment costs parameter
ξ	2	Fixed operating cost
Liquidity.		
$\overline{p}$	0.5	Liquidity probability when $R/S = 0$
$\underline{p}$	0.25	Liquidity probability when $R/S \to \infty$
λ	10	Convexity of liquidity function
SDF.		
β	0.979	Time discount factor
γ_a	-85	time varying (log) price of risk for aggregate shocks
γ_f	7.6	magnitude (log) of price of risk for counterparty shocks
SGN	-1	negative risk price for counterparty shocks

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Appendix: Full Model Fit

Moment	Data	Model	Parameter
Panel A: Aggregate moments			
Agg. output growth mean	2.57	2.01	μ_a
Agg. output growth stdev	4.17	2.23	σ_a
Agg. output growth AC(1)	0.22	0.33	-
Equity premium mean	7.73	7.80	γ_f
Equity premium stdev	15.46	15.66	γ_a
Sharpe ratio	0.50	0.50	-
Panel B: Firm-level moments			
Firm-level R/S mean	23.15	20.14	f_0
Firm-level R/S stdev	9.33	10.18	σ_f
Firm-level R/S AC(1)	0.49	0.45	-
Firm-level I/K stdev	13.40	14.29	b
Firm-level I/K AC(1)	0.48	0.19	-
Firm-level sales growth volatility	30.25	33.82	σ_c
Firm-level operating profits/sales volatility	13.60	11.13	ξ
Panel C: R/S-sorted portfolios moments			
Avg. return low R/S	14.22	13.30	-
Avg. return mid R/S	12.74	10.38	-
Avg. return high R/S	7.07	8.53	-
R/S spread	7.16	4.77	-
Exp. link duration low R/S	3.30	3.03	$\bar{p}$
Exp. link duration mid R/S	3.89	3.82	λ
Exp. link duration high R/S	3.99	3.88	$\underline{p}$

Return

Appendix: Alternative Sample Period

	Sub-sample 1: 197807 to 199606		Sub-sample 2: 199601 to 201612	
Portfolio	Mean	SD	Mean	SD
Low R/S	1.410	5.330	0.988	4.750
Medium	1.356	4.440	0.804	4.629
High R/S	0.701	6.180	0.490	5.810
Spread	0.708	4.168	0.499	4.100
(L-H)	(2.22)		(1.96)	

Return

Appendix: Alternative Breakpoints

	3070 Breakpoints		Quintile Breakpoints	
Portfolio	Mean	SD	Mean	SD
Low R/S	1.129	4.292	1.114	4.359
2	-	-	1.106	4.460
Medium	1.050	4.571	1.114	4.639
4	-	-	0.936	4.930
High R/S	0.871	5.451	0.840	5.778
Spread	0.259	2.498	0.274	3.217
(L-H)	(2.09)		(1.71)	

Return

Appendix: Distress Risk

	Low O-Score	Medium	High O-Score	
Low R/S	1.18	1.22	0.06	
Medium	1.05	1.12	0.57	
High R/S	0.63	0.62	-0.41	
Spread	0.55	0.60	0.48	Joint test
(L-H)	($p = 0.03$)	($p = 0.00$)	($p = 0.18$)	($p = 0.03$)

Return

Appendix: Testing Assumption and Implication

	Panel A	Panel B
	$\rho(TFP_c, TFP_s) > 0$	$\rho(TFP_c, R/S_s) > 0$
ρ	0.036	0.164
	(2.884)	(10.496)

Return

Appendix: Upstreamness

	Low upstreamness	Medium upstreamness	High upstreamness	
Low R/S	1.14	1.17	0.93	
Medium	1.14	1.09	1.01	
High R/S	0.85	0.55	0.49	
Spread	0.29	0.62	0.44	Joint test
(L-H)	($p = 0.08$)	($p = 0.01$)	($p = 0.03$)	($p = 0.03$)

Return

Appendix: Within-industry Evidence

Industry	Low R/S	Medium	High R/S	Spread	(L-H)
Nondurable	1.56	1.17	0.99	0.57	(2.44)
Durable	0.95	1.04	1.10	-0.15	(-0.42)
Manufacturing	0.81	1.07	0.95	-0.14	(-0.60)
Energy	1.54	1.10	0.13	1.41	(3.20)
High Tech	1.60	1.09	0.25	1.36	(4.39)
Telecommunication	1.42	1.01	0.38	1.05	(2.25)
Shops	1.12	1.22	1.04	0.09	(0.37)
Health	1.50	1.20	0.68	0.82	(2.24)
Utilities	1.12	1.01	0.91	0.21	(0.58)
Other	1.04	1.04	1.09	-0.05	(-0.18)

Return