The Global Credit Cycle and Local Real Activity

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Policy Challenges in a Changing Global Economy

Collegio Carlo Alberto
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Motivation: from local to global credit cycles

- Local credit conditions predict real activity
  - Expansions in quantity of credit predict adverse real outcomes in medium run
  - Credit spreads predict adverse real outcomes in near term
  - Some evidence on issuance credit quality mattering

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- Global comovement in asset prices
  - Rey (2013): common variation in global asset prices (Global Financial Cycle)
  - Boyarchenko and Elias (2024c): global price of *credit* risk (Global Credit Cycle)

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Do global credit conditions predict real activity?

- Does the global price of risk predict real activity?
- Does credit quality predict real activity?

This Paper

1. Global price of risk and local economic activity

2. Amplifying role of global issuance credit quality

3. Mechanisms

This Paper

1. Global price of risk and local economic activity
   - Short run: high price of risk predicts lower growth, increase downside risk
   - Medium-run: rebound in growth, return to normal in downside risk
   - Larger rebound in EM than in AE
   - Following loose spells, increased downside risk for up to 10 quarters
   - Over and above predictability from local credit spreads
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   - Investors reallocate away from government funds and into corporate funds when conditions are loose
   - Higher capital flows and probability of surges in periods with loose conditions
   - Riskier firms lever up more during loose periods but contract investment in the aftermath of loose periods

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Compression in global price of credit risk $\Rightarrow$ elevated vulnerabilities $\Rightarrow$ bigger downside risk to real activiy

Related Literature

- Local credit cycles and business cycle predictability
  - Schularick and Taylor (2012), Gourinchas and Obstfeld (2012), Gilchrist et al. (2009), Gilchrist and Zakrajšek (2012), Mian et al. (2017), López-Salido et al. (2017), Greenwood et al. (2022), Adrian et al. (2022), Müller and Verner (2023), Krishnamurthy and Muir (2025), ...

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- Financial conditions and downside risk to economic activity
  - Adrian et al. (2019), Adrian et al. (2021), Adams et al. (2021), Brownlees and Souza (2021), Adrian et al. (2022), Ferrara et al. (2022),...

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- Global Financial Cycle
  - Rey (2013), Miranda-Agrippino and Rey (2015), Miranda-Agrippino and Rey (2020), Miranda-Agrippino et al. (2020), Boyarchenko and Elias (2024c), ...

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  - This paper: global price of credit and global quality of credit predict real economic activity
- Role of Credit Quality
  - Greenwood and Hanson (2013), Kirti (2025),...

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- Global Drivers of International Capital Flows
  - Forbes and Warnock (2012, 2021), Barrot and Serven (2018), Cerutti et al. (2019), Avdjiev et al. (2020), Elias (2021), Goldberg (2023), Cerutti and Claessens (2024), Hegarty et al. (2024), Diebold and Richter (2023),...

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- Global Drivers of International Capital Flows
  - This paper: role of global intermediaries and international capital flows in transmission of global credit conditions into local economic activity

Outline of talk

1. Data
2. Methodology
3. Global Price of Risk and Local Business Cycles
4. The Role of Credit Quality
5. Mechanisms
6. Conclusion

Outline

Data

1. Standard sources for cross-country data on quarterly real GDP, investment, consumption, credit-to-GDP, policy rates, capital flows
   - Restrict to 43 countries (27 AE/16 EM) with credit-to-GDP data
   - Real macro quantities in 2015 USD terms
   - Real policy rate relative to realized 1 year CPI inflation
   - Excludes 2020 data due to outsized influence of COVID-19

Data

1. Standard sources for cross-country data on quarterly real GDP, investment, consumption, credit-to-GDP, policy rates, capital flows
2. Bond-level secondary market quotes: Lehman-Warga + ICE Global Bond Indices
   - Construct global credit price of risk to predict portfolio returns on AE issuers

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3. Bond-level issuance data matched with firm-level expected default frequencies: SDC + Mergent + Moody's KMV
   - Construct share of debt issued in a given quarter by risky firms (high default probability)
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4. Mutual fund flows at fund level: EPFR
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5. Firm-level balance sheet data matched with expected default frequencies: Worldscope + Compustat + Moody's KMV
   - Differential debt and investment growth patterns for risky vs safe firms

Data details in Boyarchenko and Elias (2023): "Corporate Credit Conditions Around the World: Novel Facts Through Holistic Data"

Outline

Motivation: predicting real activity with nonlinear dynamics

Macro-financial feedback loop

- Occasionally binding financial constraints
  - Less binding constraints during booms $\Rightarrow$ decrease price of risk $\Rightarrow$ larger expansions
  - Deterioration in balance sheet health $\Rightarrow$ nonlinear wealth dynamics $\Rightarrow$ growth declines and higher probability of crashes (downside risk to growth)
  - Bernanke and Gertler (1989), Geanakoplos (2010), Adrian and Boyarchenko (2012), He and Krishnamurthy (2013), Brunnermeier and Sannikov (2014),...
- Perceptions of exposures to shocks
  - Perceived low exposures of hhs/firms to shocks during booms $\Rightarrow$ more risk taking
  - Shock realized $\Rightarrow$ shift in beliefs $\Rightarrow$ unwind of leverage
  - Boz and Mendoza (2014), Bordalo et al. (2018), Krishnamurthy and Li (2025), Maxted (2024) ...
- Multiple equilibria
  - Sudden, discrete panic $\Rightarrow$ unwind of leverage $\Rightarrow$ sharp decrease in credit supply
  - Diamond and Dybvig (1983), Gertler and Kiyotaki (2015),Gertler et al. (2016), ...

▸ Geitner, Feb 10, 2009 ▸ IMF, Apr 16, 2020

Panel quantile regressions

Use location-scale model of Machado and Silva (2019)

$$\Delta y_{i,t+h}^{(4)} = \underbrace{\left(\alpha_{i,h} + x_{i,t}'\beta_h\right)}_{\text{Conditional mean}} + \underbrace{\left(\delta_{i,h} + x_{i,t}'\gamma_h\right)}_{\text{Conditional vol}} \underbrace{u_{i,t+h}}_{\overset{\text{i.i.d.}}{\sim} F_{u,h}}$$

- $\Delta y_{i,t+h}^{(4)}$: four-quarter growth from $t+h$ to $t+h+4$
- $x_{i,t}$: vector of conditioning variables at time t
  - Global price of risk, real GDP growth, inflation, real rate, credit-to-GDP growth
- $\alpha_{i,h}$, $\delta_{i,h}$: country fixed effects in mean and volatility
  - Countries have different average levels of growth and different (unconditional) volatility of growth
- Use GMM to estimate $\alpha_{i,h}$, $\delta_{i,h}$, β_h, γ_h, and quantile function $q_{u,h}(\cdot)$ of $u_{i,t+h}$

Panel quantile regressions

Conditional τ percent quantile

$$Q_{y,h}(\tau|x_{i,t}) = \underbrace{(\alpha_{i,h} + \delta_{i,h} q_{u,h}(\tau))}_{\text{Quantile country fixed effect}} + x'_{i,t} \underbrace{(\beta_h + \gamma_h q_{u,h}(\tau))}_{\text{Quantile coefficient}}$$

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E.g.: if $x_{i,t} \equiv$ global price of risk and:

- $\beta_h < 0 \Rightarrow$ average growth declines when global price of risk higher
- $\gamma_h > 0$, $q_{u,h} < 0$ for Q5 $\Rightarrow$ downside risk to growth increases (Q5 declines more than the mean) when global price of risk higher

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Relative to "standard" Koenker and Bassett (1978) quantile regression:

- Estimate all quantiles together $\Rightarrow$ quantiles monotonically increasing in τ
- Estimate quantile function together with the mean $\Rightarrow$ study both average path and downside risk to growth
- Panel quantile regression with quantile fixed effects $\Rightarrow$ appropriate for cross-country setting

Detour: How do we measure the global price of risk?

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"The Global Credit Cycle" – Boyarchenko and Elias (2024c)

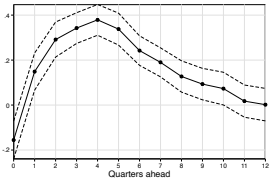
- Use portfolio-level forecasting regressions to construct measure global price of credit risk
- Tight global credit factor corresponds to:
  - Higher *future* bond-level excess returns
  - Lower contemporaneous inflows into HY + EM corporate bond funds
  - Persistent deterioration in credit conditions for firms: higher cost of debt, default probabilities

Increases in global price of credit risk $\Rightarrow$ elevated levels of bond return risk + outflows from bond mutual funds $\Rightarrow$ persistent deteriorations in credit conditions

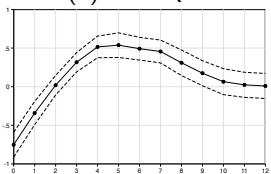
Outline

Real activity predictability

(a) GDP Mean

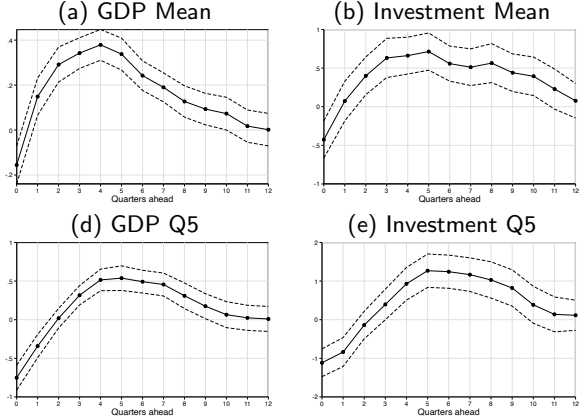


(d) GDP Q5



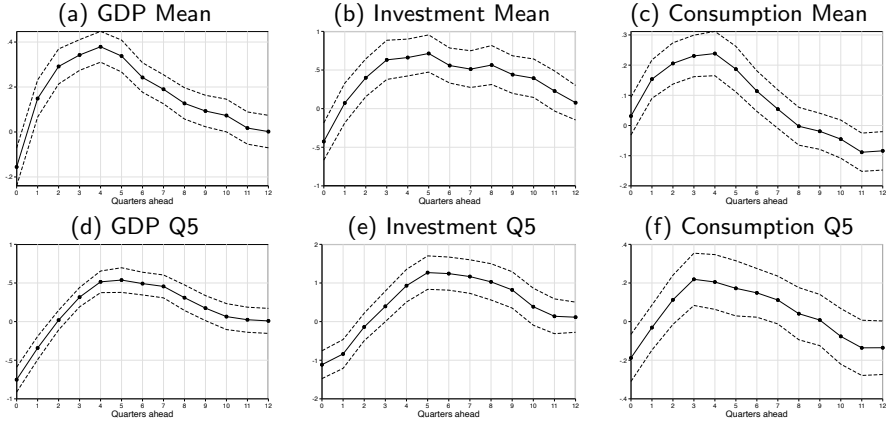
- Tight global credit $\Rightarrow$ short run crash, medium run rebound
  - Short-run decrease in growth, increase in downside risk
  - Medium-run rebound in both
  - Consistent with e.g. financial accelerator channel: high global price of risk because of binding constraints $\Rightarrow$ reduced lending

Real activity predictability



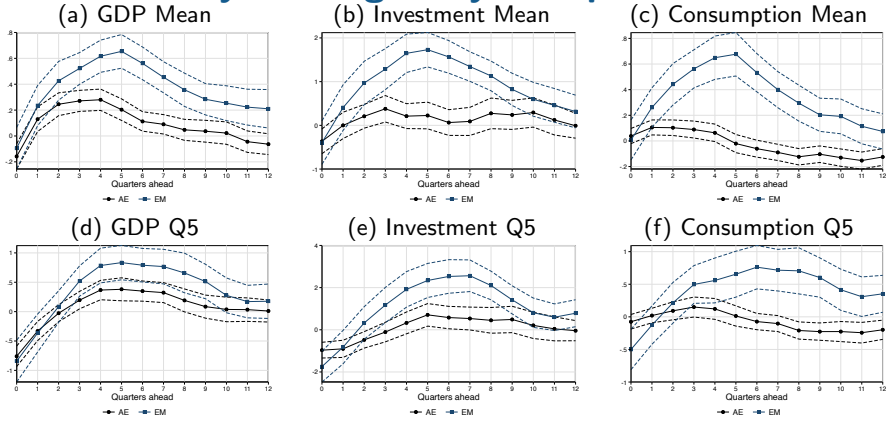
- Tight global credit $\Rightarrow$ short run crash, medium run rebound
- Larger cycle in investment
  - Consistent with the global credit factor proxying for variation in global price of corporate credit risk

Real activity predictability



- Tight global credit $\Rightarrow$ short run crash, medium run rebound
- Larger cycle in investment
- No short-run contraction in consumption, smaller medium-run boom

Is there cross-country heterogeneity in exposure?



- Similar short-run crash dynamics
  - Global decline in growth, increase in downside risk when global risk prices high

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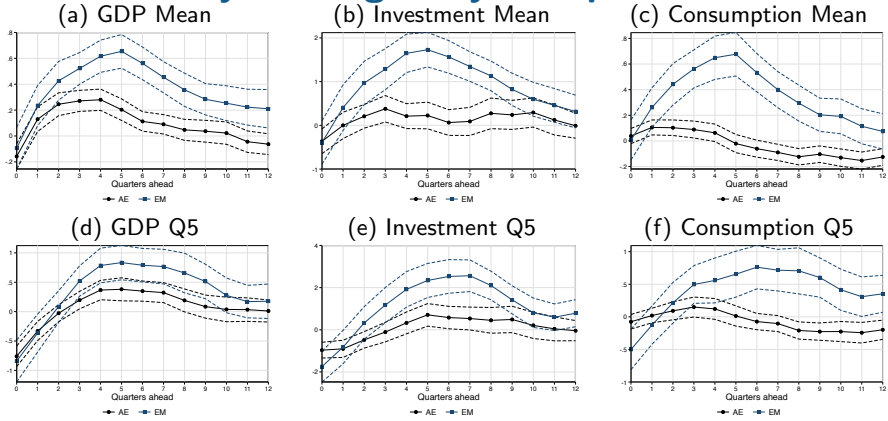

- Similar short-run crash dynamics
- Large medium-run divergence in average growth
  - And bigger rebound in consumption Q5 for EM
  - Consistent with greater sensitivity of EM financial cycles to global financial cycle (Fostel and Geanakoplos 2008)

Recap

Higher global price of risk $\Rightarrow$

- Lower expected growth, increased downside risk in the short-run
- Rebound in medium-run expected growth, return to normal in downside risk
- Larger cycle in investment
- Larger rebound for EM than AE

$\Rightarrow$ Consistent with theories focusing on dynamics following a crash

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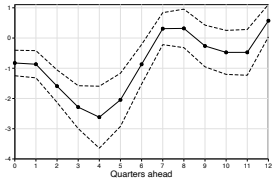
$\Rightarrow$ Consistent with theories focusing on dynamics following a crash

- What about dynamics following loose global conditions?
  - Estimate panel quantile regression using $0/1$ indicator for last quarter of a spell with tight global credit factor ($=0$) vs last quarter of a spell with loose global credit factor ($=1$)
  - Compares dynamics conditional on exiting a loose spell with dynamics conditional on exiting a tight spell

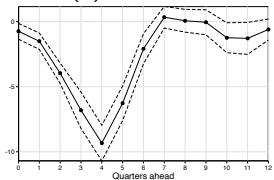
▸ Alternative measures of global financial conditions ▸ Orth. Spread

Dynamics following loose spells

(a) GDP Mean

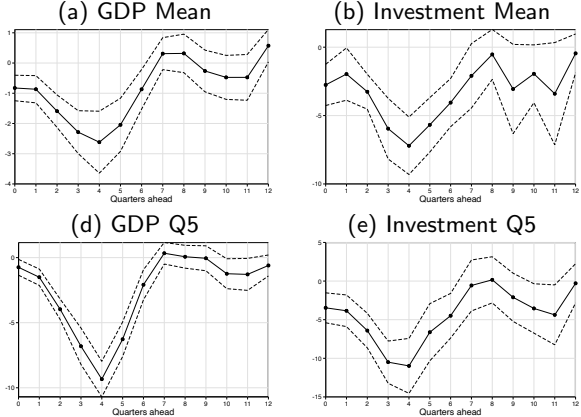


(d) GDP Q5



- Large contraction in mean and increased downside risk for real GDP growth following loose spells
  - Conditional mean and Q5 only return to baseline after $H = 6$
  - Conditional mean of *cumulative* real GDP growth remains lower than baseline for entire forecast horizon

Dynamics following loose spells



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- More pronounced contraction in investment but smaller medium term increase in downside risk

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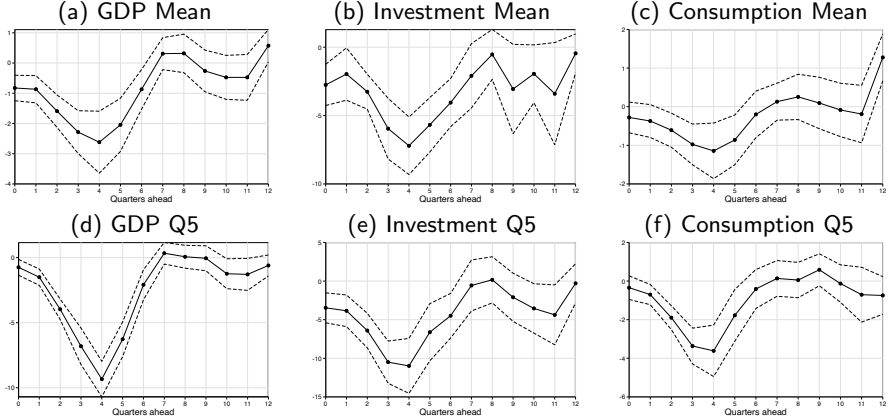

- Large contraction in mean and increased downside risk for real GDP growth following loose spells
- More pronounced contraction in investment but smaller medium term increase in downside risk
- Effect on consumption mostly through increased downside risk

Outline

The role of credit quality

Two margins of adjustment in credit markets:

- Interest rate (price) $\approx$ global credit factor
  - Tight global price of risk corresponds to short-run downside risk
  - End of loose periods followed by large, prolonged downturns

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What drives the equilibrium marginal borrower?

- Extrapolative expectations: Bordalo et al. (2018), Krishnamurthy and Li (2025), Maxted (2024), ...
- Time variation in costs of uninformed lending: Bernanke et al. (1996), Farboodi and Kondor (2020), Farboodi and Kondor (2022), Gorton and Ordoñez (2014),...
- Disagreement+heterogeneity: Fostel and Geanakoplos (2008), Hong and Sraer (2013), ...

▸ Credit quality in downturns

Measuring credit quality

- Usually: "high yield share"
  - $ share of new issuances that is high yield
  - Has some drawbacks: relies on quality and availability of credit ratings
  - Credit rating may be country-specific

Measuring credit quality

- Usually: "high yield share"
  - $ share of new issuances that is high yield
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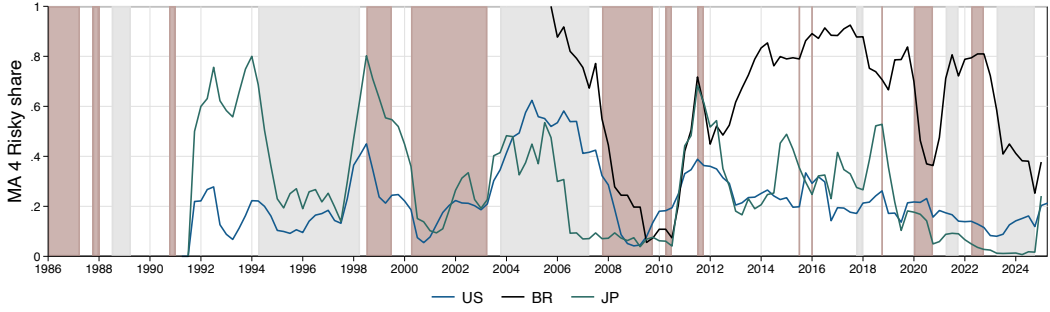
  - Credit rating may be country-specific
- Our definition: "risky share"
  - $ share of new issuances that is "risky"
  - Risky (safe) bonds: EDF higher (lower) than median of newly issued U.S. BB bonds (safest HY bonds)
  - Apples-to-apples comparison of risky issuances across countries
  - Focus on 4 quarter moving average to capture cycles in credit quality

Time series of risky shares



- Decreases during tight periods (e.g. GFC and COVID)
- Higher levels during loose periods (e.g. pre-GFC)

Comovement in credit quality across countries

	All		AE		EM	
	(1)	(2)	(3)	(4)	(5)	(6)
U. S. risky share	0.57	0.43	0.52	0.37	0.69	0.58
	(0.10)***	(0.10)***	(0.13)***	(0.13)**	(0.17)***	(0.15)***
Tight		-0.16		-0.18		-0.11
		(0.03)***		(0.04)***		(0.07)
Tight × U. S. risky share		0.59		0.64		0.47
		(0.14)***		(0.18)***		(0.21)*
Adj. R^2	0.11	0.13	0.10	0.13	0.13	0.13
N. of obs	1,784	1,784	1,279	1,279	505	505

- High correlation with U.S. risky share
- Beta particularly high during tight periods (coefficient ≈doubles)

Risky share and real activity

Approach: Augment baseline quantile regression to include risky share, interaction between risky share and global credit factor

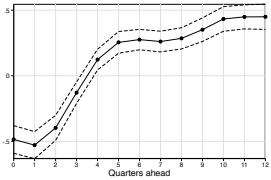
$$\Delta y^{(4)}_{i,t+h} = \left(\alpha_{i,h} + x'_{i,t}\beta_h\right) + \left(\delta_{i,h} + x'_{i,t}\gamma_h\right) u_{i,t+h}$$

- $x_{i,t}$: Global price of risk, U.S. risky share, Global price of risk $\times$ U.S. risky share, real GDP growth, inflation, real rate, credit-to-GDP growth
- U.S. risky share: proxy for global willingness to lend to risky firms
- Global price of risk $\times$ U.S. risky share: does a tightening in the global price of risk have a larger (detrimental) effect on growth when credit quality declined over the previous year?

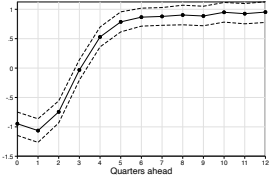
▸ Orth. local risky share

Does the U.S. risky share predict real activity?

(a) GDP Mean



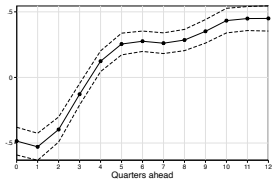
(d) GDP Q5



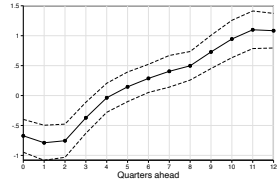
- Tight global credit $\times$ high U.S. risky share $\Rightarrow$ amplified cycle
  - Bigger short-run decrease in growth, increase in downside risk
  - Bigger medium-run rebound in both

Does the U.S. risky share predict real activity?

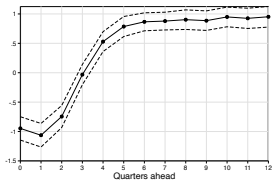
(a) GDP Mean



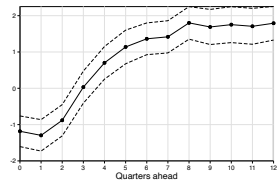
(b) Investment Mean



(d) GDP Q5

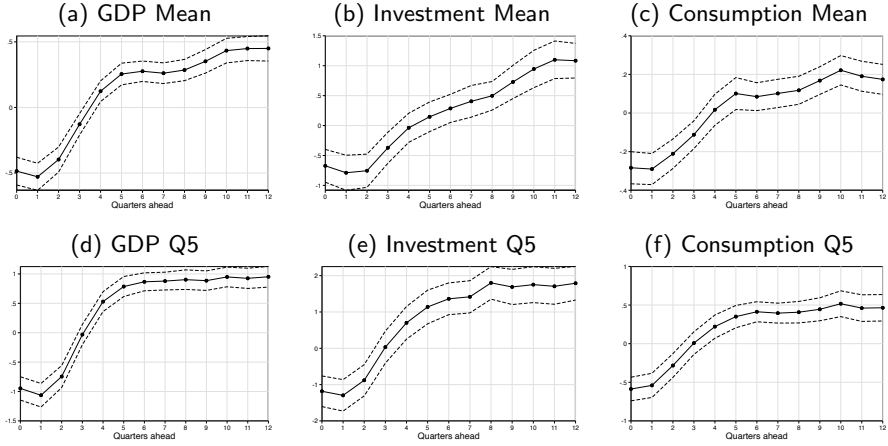


(e) Investment Q5



- Tight global credit $\times$ high U.S. risky share $\Rightarrow$ amplified cycle
- Cycle similarly amplified for investment

Does the U.S. risky share predict real activity?



- Tight global credit $\times$ high U.S. risky share $\Rightarrow$ amplified cycle
- Cycle similarly amplified for investment
- Short-run contraction in consumption, smaller boost to medium-run boom

Outline

Why do global credit conditions predict local economic activity?

- Literature on local credit cycles:
  - Credit demand vs supply
  - Behavioral vs rational lending cycles
  - ...

Why do global credit conditions predict local economic activity?

- Literature on local credit cycles:
  - Credit demand vs supply
  - Behavioral vs rational lending cycles
  - ...
- Focus here: the role of global intermediaries
  - **Investor flows into global intermediaries**: funding of global credit suppliers
  - **International capital flows**: flows that affect local credit availability

▸ Firm-level heterogeneity

The role of global intermediaries

Potential mechanism 1: Investor flows into global intermediaries

- Monthly EPFR data on global funds
- Study relationship between client flows into fixed income mutual funds and the global credit cycle (price and quality)
- Consider differential sensitivity of flows by
  - Fund asset class: government vs IG vs HY vs "all ratings"
  - Investment geographical focus: dedicated U.S., global/regional investing in other AE, global/regional investing in EM

The role of global intermediaries

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Conditional on GCC state, estimate

$$\frac{flows_{i,t}}{AUM_{i,t-1}} = \alpha_i + \beta \text{U.S. Risky Share}_{t-1} \times \mathbb{1}_r + \zeta X_{i,t} + \epsilon_{i,t}$$

Mutual fund flows

	U. S.			AExUS			EM		
	(1) Loose	(2) Normal	(3) Tight	(4) Loose	(5) Normal	(6) Tight	(7) Loose	(8) Normal	(9) Tight
L3.U. S. risky share	-0.33***	-0.65***	0.24**	-0.28**	-0.19**	-0.41***	0.24	0.02	0.00
Investment grade × L3.U. S. risky share	0.58***	0.76***	-0.28**	0.37**	0.37***	0.42**	0.46*	0.31	-0.19
All quality × L3.U. S. risky share	0.58***	0.71***	-0.41*	0.81***	0.60***	0.46*	0.13	0.51**	-0.26
High yield × L3.U. S. risky share	0.08	0.99***	-0.24*	0.48**	0.89***	0.11	1.04**	0.22	0.51
Within R^2	0.11	0.10	0.10	0.09	0.05	0.04	0.08	0.10	0.09
N. of obs	70,269	107,094	46,348	53,861	70,437	27,965	34,948	51,135	22,440
N. of funds	2,664	2,568	2,358	2,388	2,284	2,040	1,556	1,635	1,410

- Omitted category: government funds
- In general risky share predicts less flows into government funds and more flows into corporate funds
- Exception is funds that invest in the U.S. during tight periods
  - Higher risky share predicts higher flight-to-safety
- Funds that invest in EM less sensitive to risky share

The role of global intermediaries

Potential mechanism 2: International capital flows

- Quarterly data on gross international capital flows disaggregated by
  - Type: total, debt portfolio, equity portfolio, bank/other
  - Residency of the asset: foreign vs domestic
  - Eg: debt portfolio flows by foreign investors
- Identify quarters of extreme flows as in Forbes and Warnock (2012, 2021): stops, surges, flights, retrenchments

The role of global intermediaries

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Complimentary log-log regression for event probability

$$\text{Prob}\left(e_{i,t}=1\right)=1-\exp\Big(-\exp\Big(\beta^{Global}X_{t-1}^{Global}+\beta^{Contagion}X_{t}^{Contagion}+\beta^{Local}X_{i,t-1}^{Local}+$$
$$+\beta_{gcc}\text{Global Credit}_{t-1}+\beta_{e}\text{Global Credit}_{t-1}\times\text{U.S. Risky Share}_{t-1}\Big)\Big)$$

Capital Flow Surges

	(1) Total
L.Global credit	-0.30**
L.U. S. risky share	0.18**
L.Global credit × L.U. S. risky share	-0.18**
Pseudo R^2	0.07
N. of obs	4,635

- Loose global conditions (low price of risk) ⇒ higher probability of a surge next quarter
- Loose conditions (high risky share) ⇒ a higher probability of a surge

⇒ Interaction: low prices + high risky share: particularly high probability

Capital Flow Surges

	(1) Total	(2) Debt	(3) Equity	(4) FDI	(5) Bank
L.Global credit	-0.30**	-0.40***	-0.27**	-0.09	0.07
L.U. S. risky share	0.18**	-0.11	-0.04	0.25***	0.23***
L.Global credit × L.U. S. risky share	-0.18**	-0.28***	-0.25***	0.03	-0.02
Pseudo R^2	0.07	0.02	0.03	0.06	0.05
N. of obs	4,635	4,528	4,528	4,634	4,623

- Loose global conditions (low price of risk) $\Rightarrow$ higher probability of a surge next quarter
- Loose conditions (high risky share) $\Rightarrow$ a higher probability of a surge

$\Rightarrow$ Interaction: low prices + high risky share: particularly high probability

- Interaction results driven by portfolio flows (debt and equity)

Capital flow surges vs. stops

Surges

	(1) Total	(2) Debt	(3) Equity	(4) FDI	(5) Bank
L.Global credit	-0.30**	-0.40***	-0.27**	-0.09	0.07
L.U. S. risky share	0.18**	-0.11	-0.04	0.25***	0.23***
L.Global credit × L.U. S. risky share	-0.18**	-0.28***	-0.25***	0.03	-0.02
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N. of obs	4,635	4,528	4,528	4,634	4,623

Stops

	(1) Total	(2) Debt	(3) Equity	(4) FDI	(5) Bank
L.Global credit	0.21***	0.23***	0.06	0.17*	0.03
L.U. S. risky share	-0.19**	-0.02	0.00	-0.20***	-0.21***
L.Global credit × L.U. S. risky share	0.03	-0.02	-0.10*	0.14**	-0.03
Pseudo R^2	0.12	0.03	0.02	0.05	0.13
N. of obs	4,635	4,528	4,528	4,634	4,623

- Asymmetries between surges and stops
- Loose global conditions (low price of risk) $\Rightarrow$ higher probability of surges, lower probability of stops
- Risky share predicts only in one tail of the flow distribution:
  - Risky share more informative during booms

Capital flows: foreign vs. domestic investors

Surges

	(1) Total	(2) Debt	(3) Equity	(4) FDI	(5) Bank
L.Global credit	-0.30**	-0.40***	-0.27**	-0.09	0.07
L.U. S. risky share	0.18**	-0.11	-0.04	0.25***	0.23***
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Stops

	(1) Total	(2) Debt	(3) Equity	(4) FDI	(5) Bank
L.Global credit	0.21***	0.23***	0.06	0.17*	0.03
L.U. S. risky share	-0.19**	-0.02	0.00	-0.20***	-0.21***
L.Global credit × L.U. S. risky share	0.03	-0.02	-0.10*	0.14**	-0.03
Pseudo R^2	0.12	0.03	0.02	0.05	0.13
N. of obs	4,635	4,528	4,528	4,634	4,623

Retrenchment

	(1) Total	(2) Debt	(3) Equity	(4) FDI	(5) Bank
L.Global credit	0.20***	0.17**	0.22***	0.15*	0.16*
L.U. S. risky share	-0.17**	0.03	-0.33***	-0.07	-0.06
L.Global credit × L.U. S. risky share	0.06	-0.07	0.01	0.13**	-0.04
Pseudo R^2	0.10	0.03	0.05	0.08	0.08
N. of obs	4,635	4,542	4,542	4,635	4,634

Flight

	(1) Total	(2) Debt	(3) Equity	(4) FDI	(5) Bank
L.Global credit	-0.22	-0.19	-0.10	-0.06	0.05
L.U. S. risky share	0.20**	0.05	-0.01	0.26***	0.04
L.Global credit × L.U. S. risky share	-0.21**	-0.12	-0.12*	-0.02	-0.03
Pseudo R^2	0.06	0.04	0.02	0.05	0.02
N. of obs	4,635	4,542	4,542	4,635	4,634

- Very little predictability of domestic investors' behavior

$\Rightarrow$ Consistent with global credit factor and U.S. risky share capturing behavior of global investors

Outline

Conclusion

- Explored the role of global credit conditions in predicting local real activity
- A proxy for the global price of risk predicts local economic activity
  - Low price of risk predicts lower mean GDP growth and increased downside risk
- Role of issuance credit quality
  - Lax "lending standards" further accentuate downside risks to the economy during loose periods
- Investor flows into global funds and international capital flows sensitivity to global conditions suggest important role of global intermediaries

Broader research agenda

Interaction between credit markets, firms' decisions, and real activity

- Use rich heterogeneity in debt capital structures across firms, countries, ...
- Elias (2021): "Capital flows and the real effects of corporate rollover risk"
  - Real effects of rollover risk during stop episodes
- Boyarchenko and Elias (2024b): "Financing Private Credit"
  - Composition of firms' liabs and of fin sector affects the transmission of mon policy
- Boyarchenko and Elias (2024a): "Corporate Debt Structure over the GCC"
  - GCC drives firms' capital structure decisions
- Boyarchenko and Elias (2024c): "The Global Credit Cycle "
  - A global credit factor prices corporate bonds around the world
- Boyarchenko and Elias (2025): "Financing firm-level growth through the GCC"
  - Changing credit market access through GCC drives firm-level growth

Boyarchenko and Elias (2023): dataset construction and stylized facts about primary market issuance, secondary market pricing, amounts outstanding,...

Appendix

February 10, 2009

"Last Friday we learned that the economy had lost three million jobs last year, and an additional 600,000 just last month...Instead of catalyzing recovery, the financial system is working against recovery. And at the same time, the recession is putting greater pressure on banks.

This is a dangerous dynamic, and we need to arrest it...Today, as Congress moves to pass an Economic Recovery Plan that will help create jobs and lay a foundation for stronger economic future, we [at the US Treasury] are outlining a new Financial Stability Plan...Our plan will help restart the flow of credit, clean up and strengthen our banks, and provide critical aid for homeowners and for small businesses...

We believe that action has to be sustained until recovery is firmly established. In the United States in the 30s, Japan in the 90s, and in other cases around the world, previous crises lasted longer and caused greater damage because governments applied the brakes too early. We cannot make that mistake."

Treasury Secretary Geithner Introduces Financial Stability Plan

◂ Back

April 16, 2020

"The coronavirus (COVID-19) pandemic poses unprecedented health, economic, and financial stability challenges. Several factors amplified asset price moves: previously overstretched asset valuations, pressures to unwind leveraged trades, dealers' balance-sheet constraints, and a deterioration in market liquidity. [...]

[...] financial conditions tightened at an unprecedented speed. Decisive monetary, financial, and fiscal policy actions [...] managed to stabilize investor sentiment in late March–early April, with markets paring back some of their losses. A further tightening of financial conditions may expose more "cracks" in global financial markets and test the resilience of financial institutions.

Wide-ranging fiscal, monetary, and financial policies [...] remain essential to safeguard economic and financial stability and to prevent the emergence of adverse macro-financial feedback loops."

IMF Global Financial Stability Report: Markets in the Time of COVID-19

◂ Back

Factor extraction: Motivation

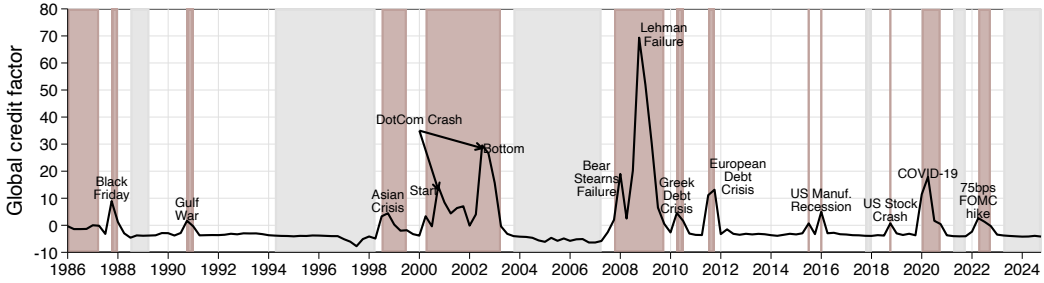
Is there a "global" price of credit risk? How does it evolve over time?

Factor extraction: Motivation

Is there a "global" price of credit risk? How does it evolve over time?

- Structural approach: model of a global pricing kernel
  - Assumptions on preferences, marginal investor, ...

Global credit factor



- High VIX and spreads ⇒ high GCC level (e.g. GFC and COVID)
- Low VIX and low level of spreads ⇒ low GCC level (e.g. pre-GFC)

▸ Procedure ▸ Cross-sectional tests ▸ Credit conditions

Factor extraction: Motivation

Is there a "global" price of credit risk? How does it evolve over time?

- Structural approach: model of a global pricing kernel
  - Assumptions on preferences, marginal investor, ...
- Factor approach: relationship between return cross-section and factors
  - Linear relationship, assumptions on which factors are priced, ...

Factor extraction: Motivation

Is there a "global" price of credit risk? How does it evolve over time?

- Structural approach: model of a global pricing kernel
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- Factor approach: relationship between return cross-section and factors
  - Linear relationship, assumptions on which factors are priced, ...
- Our approach: nonparametric estimation from panel forecasting regression
  - Assume that price of risk can be parametrized as a function of observables: U. S. credit spreads, VIX
  - Nonparametric $\Rightarrow$ nonlinear relationship between observables and future returns
  - Panel $\Rightarrow$ use both cross-sectional and time-series information to estimate
  - More than one observable $\Rightarrow$ proxy for more than one investor's effective risk aversion

Factor extraction: Procedure

Goal: estimate $\mathbb{E}_t\left[rx_{M,t+h}\right] \equiv \varphi\left(cs_t, \text{VIX}_t\right)$

- Approximate $\varphi\left(cs_t, \text{VIX}_t\right)$ using a bi-variate spline basis: $\varphi\left(cs_t, \text{VIX}_t\right) = \gamma_h' X_{m,t}$

- Conditional CAPM:

$$rx_{i,t+h} = a_{i,h} + b_{i,h}\mathbb{E}_t\left[rx_{M,t+h}\right] + \epsilon_{i,t+h} = a_{i,h} + b_{i,h}\left(\gamma_h' X_{m,t}\right) + u_{i,t+h}$$
$$u_{i,t+h} = \epsilon_{i,t+h} + b_{i,h}\left(\mathbb{E}_t\left[rx_{M,t+h}\right] - \left(\gamma_h' X_{m,t}\right)\right)$$

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- Conditional CAPM:

$$\overrightarrow{rx}_{t+h} = \vec{a}_h + \vec{b}_h\left(\gamma_h' X_{m,t}\right) + \vec{u}_{t+h}$$

- Estimate $\vec{b}_h$, γ_h using an outlier-robust reduced rank regression
  - Test portfolios: advanced economy bonds, sorted into rating buckets (AAA/AA, A, BBB, high yield)
  - Rank of $\gamma_h \equiv$ number of forecasting pricing factors necessary
  - Use out-of-sample performance criterion to select bi-variate basis, number of factors
  - Outlier-robust: identify periods when ex-post realized returns deviate from ex-ante expected returns

Global credit factor as a pricing factor

Consider: equilibrium pricing kernel with affine prices of risk

$$\lambda_t = \lambda_0 + \lambda_1 \varphi\left(cs_t, \mathrm{VIX}_t\right)$$

- Expected returns:

$$\mathbb{E}_t\left[rx_{i,t+h}\right] = \alpha_{i,h} + \beta_{i,h}\left(\lambda_0 + \lambda_1 \varphi\left(cs_t, \mathrm{VIX}_t\right)\right)$$

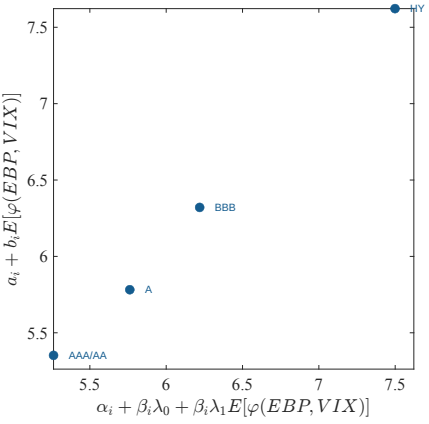
- Following Adrian et al. (2015), restricted return dynamics:

$$\begin{aligned} rx_{i,t+h} &= \alpha_{i,h} + \beta_{i,h}\left(\lambda_0 + \lambda_1 \varphi\left(cs_t, \mathrm{VIX}_t\right)\right) + \beta_{i,h} u_{t+h} + \epsilon_{i,t+h} \\ u_{t+h} &= \varphi\left(cs_{t+h}, \mathrm{VIX}_{t+h}\right) - \mathbb{E}_t\left[\varphi\left(cs_{t+h}, \mathrm{VIX}_{t+h}\right)\right] \end{aligned}$$

$\Rightarrow$ dynamic asset pricing restriction

$$a_i = \alpha_i + \beta_i \lambda_0; \quad b_i = \beta_i \lambda_1$$

Global credit factor in the cross-section



Affine price of risk: $\lambda_t = \lambda_0 + \lambda_1 \varphi\left(cs_t, \mathrm{VIX}_t\right)$

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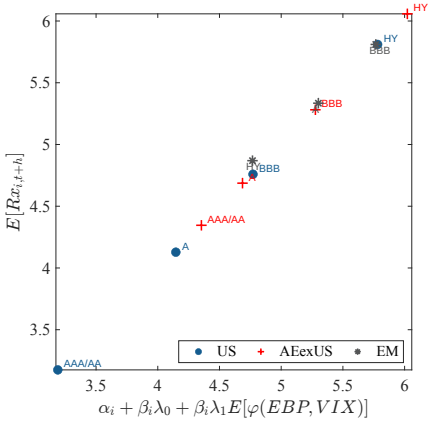
Test 1: Target portfolios for factor construction

- Predicted returns from SRRR and DAPM line up

$\Rightarrow$ cross-sectional asset pricing restriction satisfied

Back

Global credit factor in the cross-section



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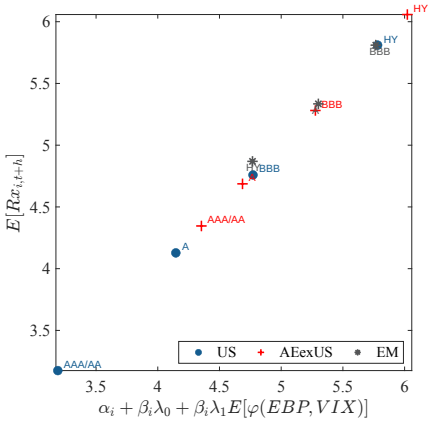
Test 2: Other country-level portfolios

- Predicted returns from DAPM line up with average realized returns

$\Rightarrow$ cross-sectional asset pricing restriction satisfied

Back

Global credit factor in the cross-section



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Test 2: Other country-level portfolios

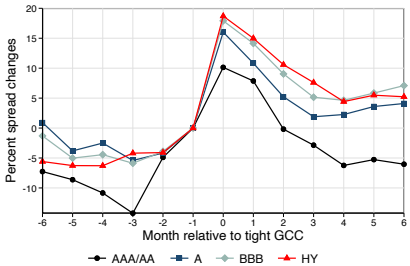
- Predicted returns from DAPM line up with average realized returns

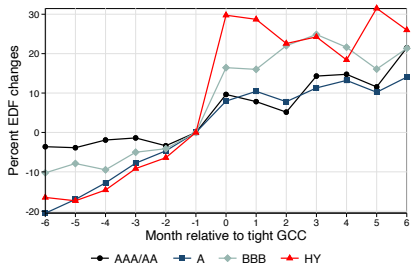
$\Rightarrow$ cross-sectional asset pricing restriction satisfied

$\Rightarrow \varphi\left(cs_t, \text{VIX}_t\right)$ captures time series variation in the global price of credit risk

Back

Tight GCC $\Rightarrow$ persistent deterioration in credit conditions



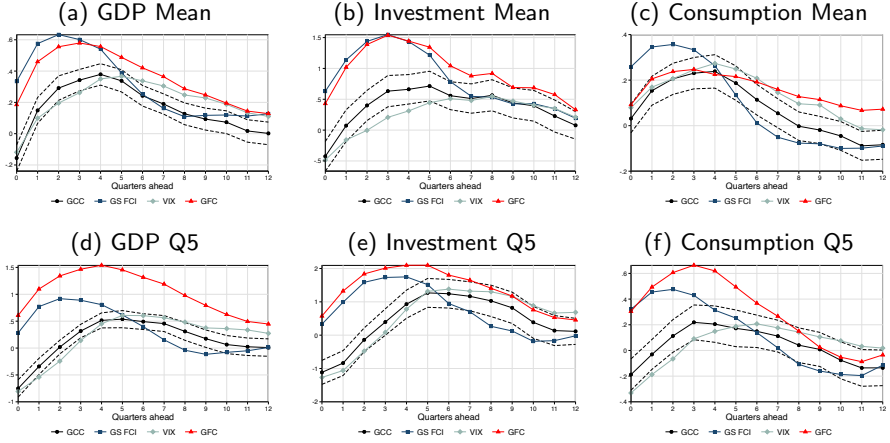


- Spreads remain elevated for up to 6 months after start of GCC tightening
  - Interest costs increases for new debt
  - Deterioration in ability to issue new debt
- EDFs remain elevated 6 months after start of GCC tightening

GCC tightening corresponds to persistently increased risks

Back

Alternative global financial conditions



- Similar longer-run dynamics across all
- No short-run crashes in Goldman Sachs U.S. financial conditions index (GS FCI), Miranda-Agrippino et al. (2020) global financial cycle factor (GFC)

Back

Does the local spread add information?

	$H=0$			$H=4$			$H=8$			$H=12$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Mean												
Local spread	-0.38			0.12			0.14			0.12		
	(0.06)***			(0.06)*			(0.05)***			(0.05)**		
Global credit		-0.13	-0.15		0.40	0.38		0.16	0.16		0.11	0.11
		(0.06)**	(0.06)***		(0.04)***	(0.04)***		(0.04)***	(0.04)***		(0.05)**	(0.05)**
Orth. local spread			-0.40			-0.21			0.03			0.07
			(0.07)***			(0.07)***			(0.07)			(0.07)
Q5												
Local spread	-0.87			0.32			0.62			0.61		
	(0.09)***			(0.13)**			(0.11)***			(0.14)***		
Global credit		-0.82	-0.83		0.51	0.52		0.37	0.39		0.20	0.23
		(0.10)***	(0.11)***		(0.08)***	(0.08)***		(0.10)***	(0.10)***		(0.11)*	(0.11)**
Orth. local spread			-0.44			0.02			0.50			0.68
			(0.10)***			(0.17)			(0.15)***			(0.15)***
N. of obs	3,039	3,039	3,039	2,731	2,731	2,731	2,580	2,580	2,580	2,529	2,529	2,529

- Local spread predicts similarly to global variable
- Orthogonal local spread predicts even after controlling for the global factor

$\Rightarrow$ Orthogonal local spread contains additional information

◂ Back Price ◂ Back RS

The role of credit quality in downturns

- **Financial accelerator channel**: riskier firms loose access to credit in downturns, when they need credit the most
- **Extrapolative expectations channel**: higher realized default rates of riskier borrowers extrapolated to beliefs about broader economy
- **Information acquisition channel**: as share of riskier firms with access to credit rises, investors more likely to want to acquire information, leading to credit rationing for riskier firms and overall spread increases
- **Collateral value channel**: increases in disagreement (e.g. following bad news) reduce collateral values, leading to less leverage capacity for lower quality borrowers

Back

Does the local risky share add information?

	$H = 0$		$H = 4$		$H = 8$		$H = 12$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mean								
Global credit	-0.43***	-0.38***	0.48***	0.51***	0.17***	0.18***	0.01	0.05
U. S. risky share	-0.06	-0.09	-0.07	-0.04	-0.52***	-0.52***	-0.47***	-0.50***
U. S. risky share × Global credit	-0.48***	-0.56***	0.16**	0.12	0.24***	0.23***	0.13*	0.08
Orth. local risky share		0.14**		0.33***		0.03		0.01
Orth. local risky share × Global credit		0.23*		-0.00		0.02		0.17***
Q5								
Global credit	-1.77***	-1.69***	0.64***	0.60***	0.98***	0.98***	0.55***	0.61***
U. S. risky share	-0.14	-0.19	-0.51***	-0.32**	-0.75***	-0.73***	-1.10***	-1.14***
U. S. risky share × Global credit	-0.97***	-1.08***	0.37***	0.53***	1.03***	1.05***	0.77***	0.75***
Orth. local risky share		0.17		0.67***		0.14		-0.10
Orth. local risky share × Global credit		0.22		-0.68***		-0.10		0.17
N. of obs	1,390	1,390	1,230	1,230	1,158	1,158	1,132	1,132

- U.S. risky share estimates mostly unaffected
- Local risky share mostly statistically insignificant

Orth. Spread Back U.S. RS

Why does higher risky share predict greater downside risk?

- More risk taking by riskier firms during loose conditions $\Rightarrow$ build up of vulnerabilities especially in riskier firms
- More vulnerable firms decrease activity more during downturns

Why does higher risky share predict greater downside risk?

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Use firm-level balance sheet data for firms around the world to estimate:

- How is debt growth affected by U.S. risky share and firm risk?

$$\frac{TD_{i,t+h} - TD_{i,t}}{TA_{i,t}} = \alpha_i + \beta_{rs}\text{U.S. risky share}_t + \beta_{edf}\text{EDF}_{i,t-1} + \beta_{rt}\text{U.S. risky share}_t \times \text{EDF}_{i,t-1} + \text{Firm-level controls}_{i,t-1} + \epsilon_{i,t+h}$$

- Does investment of riskier firms respond to U.S. risky share and firm risk?

$$\frac{Inv_{i,t+h} - Inv_{i,t}}{TA_{i,t}} = \alpha_i + \beta_{rs}\text{U.S. risky share}_t + \beta_{edf}\text{EDF}_{i,t} + \beta_{rt}\text{U.S. risky share}_t \times \text{EDF}_{i,t} + \text{Firm-level controls}_{i,t} + \epsilon_{i,t+h}$$

Back

Firm-level debt

	(1) $H = 1$	(2) $H = 1$	(3) $H = 2$	(4) $H = 2$
U. S. risky share	0.38***	0.35***	0.52***	0.45***
L.Log EDF	-9.28***	-8.00***	-15.07***	-13.42***
U. S. risky share × L.Log EDF	0.27**	0.31***	-0.12	-0.07
Excl. U. S.		✓		✓
Within R^2	0.03	0.03	0.05	0.05
N. of obs	281,182	223,035	260,249	207,520

- Firms expand debt more when U.S. risky share is elevated (results not driven by U.S. firms
- Riskier firms (higher EDF) lever up less

⇒ Interaction: Riskier firms lever up **more** that safe firms when conditions are looser

- Consistent with the idea that the risky share variable captures more risk taking

Firm-level investment

	(1) $H = 1$	(2) $H = 2$	(3) $H = 3$	(4) $H = 4$
U. S. risky share	0.02***	-0.02***	-0.05***	-0.07***
Log EDF	-1.10***	-0.92***	-0.82***	-0.64***
U. S. risky share × Log EDF	-0.12***	-0.08*	0.08	0.14**
Within R^2	0.03	0.05	0.06	0.08
N. of obs	241,217	221,694	203,745	186,869

- Higher investment in periods with high risk share, but lower in the years after
- Riskier firms expand investment less overall
- Particularly following periods with elevated risk taking

$\Rightarrow$ Riskier firms expand debt more when the risky share is high and contract investment more following periods of high risky share Back

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