Credit-Market Sentiment and the Business Cycle

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February 2015

The Question

- Can "frothy" conditions in asset markets create risk to future macroeconomic performance?
  - If so, which markets and what measures of froth/sentiment?
  - What are the channels of transmission?

Our Approach

- What is credit-market "sentiment?"
  - Variables that forecast future returns to bearing credit risk:
    - level of credit spreads and high-yield share of bond issuance
      Greenwood & Hanson (2013)
    - term spread
- Find that buoyant credit-market sentiment at time $t-2$ forecasts:
  - Widening of credit spreads at time t.
  - Significant declines in economic activity at time t, $t+1$, and $t+2$.

Standard Empirical Approach

- Forecasting regression specification:

$$\Delta y_{t+h} = \beta \Delta s_t + \boldsymbol{\gamma}' \mathbf{x}_t + \epsilon_{t+h}; \quad h \geq 1$$

  - Δy_{t+h} = change in a measure of economic activity
  - Δs_t = change in the credit spread
  - $\mathbf{x}_t$ = control variables

- OLS estimate of β suffers from obvious reverse causality.

Our Approach

- Replace Δs_t with time $t-2$ predictors of expected credit returns ($\mathbf{z}_{t-2}$):

$$\begin{aligned} \Delta s_t &= \boldsymbol{\theta}' \mathbf{z}_{t-2} + \nu_t \\ \Delta y_{t+h} &= \beta \Delta \hat{s}_t + \boldsymbol{\gamma}' \mathbf{x}_t + \epsilon_{t+h} \end{aligned}$$

- β captures the effect of Δs_t that comes from unwinding of past sentiment and not from changes in expected defaults.
- Separates discount-rate variation from variation in expected cashflows.

What About the Stock Market?

- Specification:

$$\begin{aligned} r_t^M &= \boldsymbol{\theta}' \mathbf{z}_{t-1} + \nu_t \\ \Delta y_{t+h} &= \beta \hat{r}_t^M + \boldsymbol{\gamma}' \mathbf{x}_t + \epsilon_{t+h} \end{aligned}$$

- Can find $t-1$ "sentiment" variables that forecast r_t^M:
  - $\mathbf{z}_{t-1}$: dividend yield, equity issuance share, cyclically adjusted P/E ratio
    Cochrane (2008,2012); Baker & Wurgler (2000); Shiller (2000)
- Equity-market sentiment does not forecast economic activity ($\hat{\beta} = 0$):
  - Suggests fundamental difference between the equity and credit markets.
  - **Conjecture**: Drop in the stock market has less of an effect on the availability of financing than disruptions in credit markets.

Economic Significance

- A swing in credit-market sentiment—in the fitted value of Δs_t—from P25 to P75 in year $t-2$ implies a cumulative:
  - Decline in real GDP growth of about 4 pps. between t and $t+2$.
  - Decline in real BFI growth of about 8 pps. between t and $t+2$.
  - Increase in unemployment rate of about 2 pps. between t and $t+2$.

What About Leverage?

- Maybe sentiment forecasts economic activity through some other channel, rather than through its effect on future credit market conditions.
- **Example**: frothy credit markets $\Rightarrow$ nonfinancial firms lever up $\Rightarrow$ subsequent macroeconomic fragility
  - Controlling for changes in nonfinancial sector leverage has no effect on results.

What About Credit Growth?

- Replicate prior evidence that sustained growth in bank credit predicts future economic downturns—"credit booms go bust."

  Schularick & Taylor (2012); Jordá, Schularick & Taylor (2013)

- In a horse race, credit-market sentiment drives out bank credit growth.
- Implications:
  - Not necessarily a different story.
  - Bond market variables may be a better proxy for sentiment.
  - Though suggestive of disruptions not just in bank loan supply, but also in wider supply of credit.

Possible Mechanism

- Why might an increase in credit spreads (not related to default risk) be expected to reduce economic growth?
- Explore hypothesis that widening of credit spreads leads to a broad-based reduction in credit supply.
  - Not just through the banking sector but also through capital markets.
- Mechanism:
  - Wider spreads $\Rightarrow$ drop in HY issuance; not so for IG issuance.
  - Wider spreads $\Rightarrow$ changes in firms' financing mix: equity issuance $\uparrow$, while debt issuance $\downarrow$
  - Wider spreads $\Rightarrow$ drop in investment of lower-quality firms relative to that of higher-quality firms.
- Decline in investment and the reduction in debt relative to equity $\Rightarrow$ increase in the relative cost of debt finance.

Causes of Variation in Credit-Market Sentiment

- A combination of easy monetary policy and reach-for-yield may lead to downward pressure on credit-risk and term premiums.
- If so, accommodative monetary policy may involve an intertemporal tradeoff:
  - Stimulates economy today but reduces growth later on.

Connection to the Literature

- Role of financial markets in business cycle fluctuations.

  Bernanke & Gertler (1989); Kiyotaki & Moore (1997), Bernanke, Gertler & Gilchrist (1999)

- We emphasize time-variation in expected returns to investors in credit markets as key driver of the business cycle.
  - **Financial accelerator** $\Rightarrow$ no time-variation in expected returns, only in the efficacy of credit-intermediation process
  - **Our approach**: behavioral finance meets macro

    Minsky (1977); Kindleberger (1978)

Roadmap

- **Warmup**: predictive OLS regressions of economic activity on changes in credit spreads and stock returns (1929–2013).
- Regressions of economic activity on changes in credit spreads and stock returns due to changes in market sentiment:
  (a) Baseline results (1929–2013).
  (b) Robustness: different subsamples/horizons and activity measures.
  (c) Additional measures of credit-market sentiment.
  (d) Controlling for leverage and credit growth.
- Inspecting the mechanism:
  (a) A simple model.
  (b) Evidence on the mechanism: response of financing mix and investment to changes in credit-market sentiment.
- Policy implications.

Warmup OLS Regressions

- Standard forecasting regression:

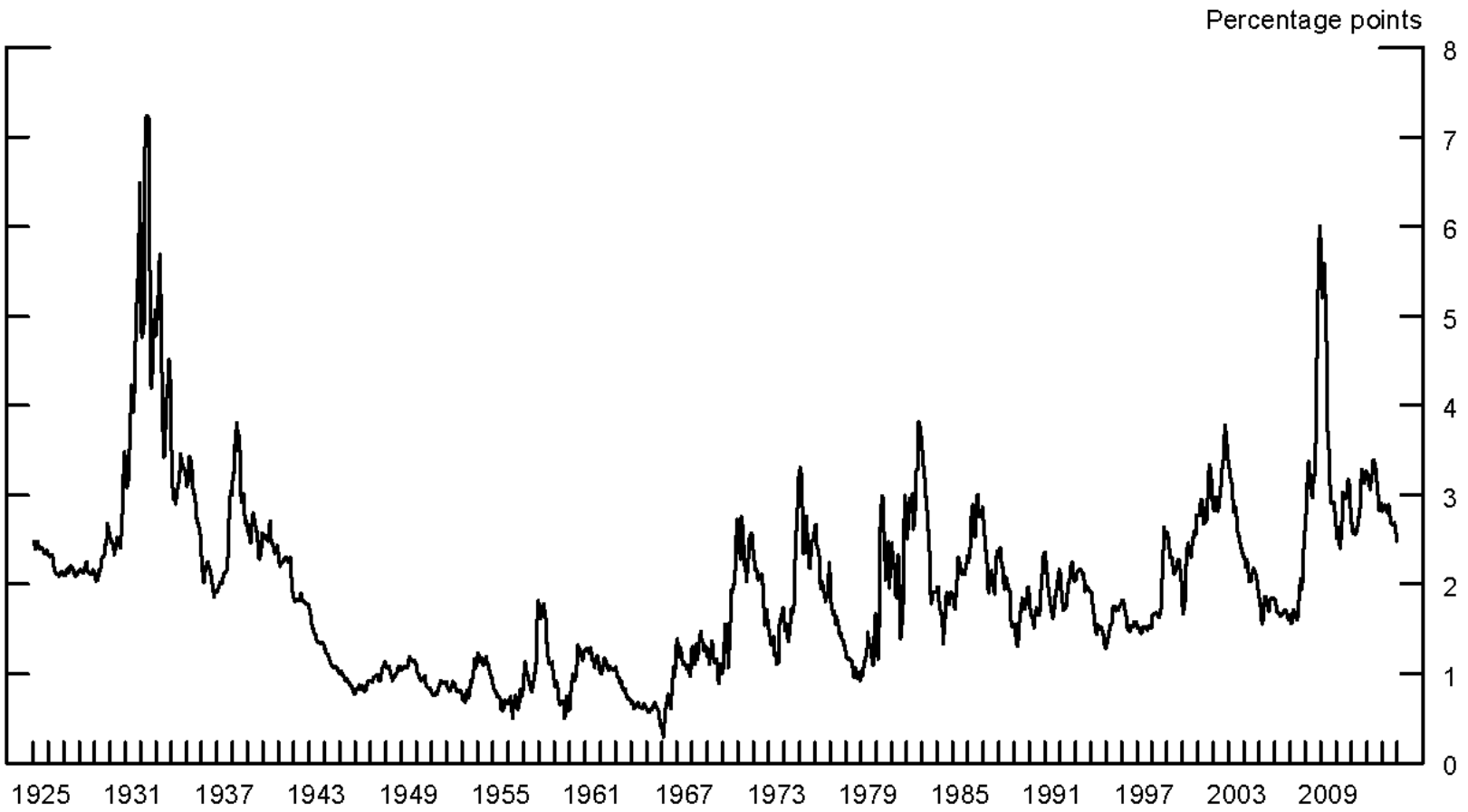
$$\Delta y_{t+1} = \beta_1 \Delta s_t + \beta_2 r_t^M + \boldsymbol{\gamma}' \mathbf{x}_t + \epsilon_{t+1}$$

  - Δy_{t+1} = log-difference of real GDP (per capita)
  - Δs_t = change in Baa-Treasury spread
  - r_t^M = stock market (log) return
  - $\mathbf{x}_t = \Delta y_{t-1}$, $\Delta i_t^{(3m)}$, π_t, WW-II and Korean War dummies

- **Sample period**: annual data, 1929–2013

Moody's Baa-Treasury Corporate Bond Spread

Sample period: 1925:M1–2013:M12



Credit Spreads, the Stock Market & Economic Growth

Dep. variable: Δy_{t+1}; Sample period: 1929–2013

Regressors	(1)	(2)	(3)	(4)
Δs_t	-2.007^{***}	.	-1.569^{**}	-1.592^{**}
	(0.744)		(0.603)	(0.626)
r_t^M	.	0.090^{***}	0.055^{***}	0.054^{***}
		(0.020)	(0.017)	(0.018)
Δy_t	0.556^{***}	0.566^{***}	0.591^{***}	0.586^{***}
	(0.103)	(0.117)	(0.102)	(0.097)
$\Delta i_t^{(3m)}$	.	.	-0.646^{***}	-0.659^{***}
			(0.222)	(0.245)
π_t	.	.	.	0.027
				(0.075)
$\bar{R}^2$	0.501	0.504	0.536	0.531
Standardized effect on Δy_{t+1}				
Δs_t	-0.371	.	-0.290	-0.294
r_t^M	.	0.379	0.230	0.227

NOTE: Standard errors in parentheses: $^{*}p < .10$, $^{**}p < .05$, and $^{***}p < .01$.

Financial Market Sentiment and Economic Growth

- Empirical specification:

$$\begin{aligned} \Delta s_t &= \boldsymbol{\theta}_1' \mathbf{z}_{1,t-2} + \nu_{1t} \\ r_t^M &= \boldsymbol{\theta}_2' \mathbf{z}_{2,t-1} + \nu_{2t} \\ \Delta y_{t+h} &= \beta_1 \Delta \hat{s}_t + \beta_2 \hat{r}_t^M + \boldsymbol{\gamma}' \mathbf{x}_t + \epsilon_{t+h} \quad (h \geq 0) \end{aligned}$$

- Variation in expected returns due to changes in market sentiment:
  - $\mathbf{z}_{1,t-2}$: s_{t-2}, $\log \mathrm{HYS}_{t-2}$
    Greenwood & Hanson (2013)
  - $\mathbf{z}_{2,t-1}$: $\log[D/P]_{t-1}$, $\log \mathrm{ES}_{t-1}$, or $\log[P/\tilde{E}]_{t-1}$
    Cochrane (2008,2012); Baker & Wurgler (2000); Shiller (2000)

Financial Market Sentiment & Economic Growth

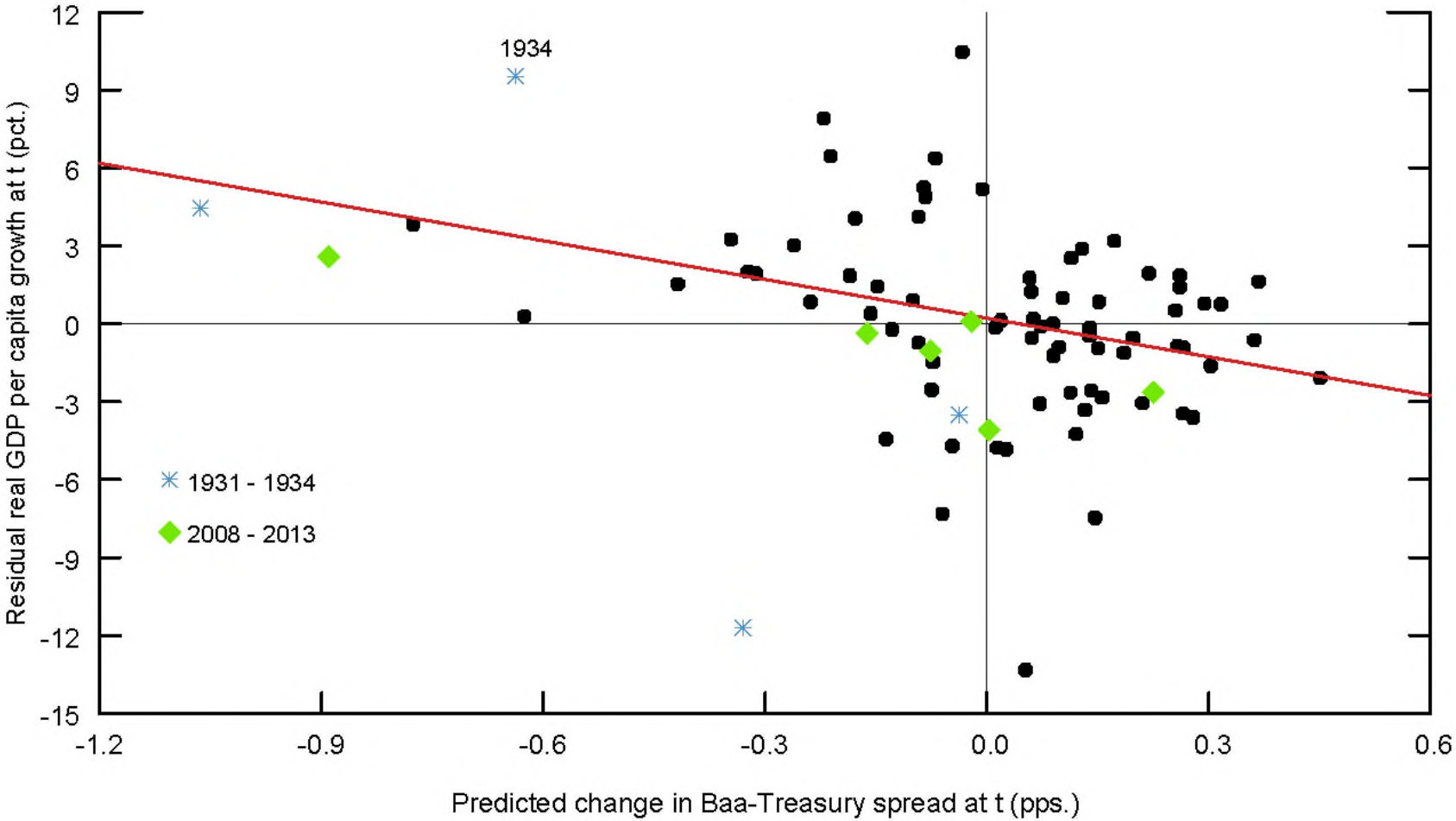
Dep. variable: Δy_t; Sample period: 1929–2013

Regressors	(1)	(2)	(3)	(4)	(5)
$\Delta \hat{s}_t$	-5.237^{***}	.	.	-4.830^{***}	-5.004^{***}
	(1.449)			(1.027)	(1.385)
$\hat{r}_t^M$	.	0.155	.	0.081	.
		(0.145)		(0.113)	
$\hat{r}_t^{\mathcal{P}}$	.	.	0.132^{*}	.	0.058
			(0.072)		(0.062)
Δy_{t-1}	0.596^{***}	0.524^{***}	0.535^{***}	0.598^{***}	0.601^{***}
	(0.126)	(0.103)	(0.108)	(0.123)	(0.130)
R^2	0.398	0.342	0.336	0.404	0.402
	Auxilliary Forecasting Regressions				
	Δs_t	r_t^M	$r_t^{\mathcal{P}}$		
$\log \mathrm{HYS}_{t-2}$	0.077^{***}	.	.		
	(0.026)				
s_{t-2}	-0.242^{***}	.	.		
	(0.038)				
$\log[D/P]_{t-1}$	.	0.105^{**}	.		
		(0.045)			
$\log \mathrm{ES}_{t-1}$	.	-0.083^{**}	.		
		(0.039)			
$\log[P/\bar{E}]_{t-1}$	.	.	-0.136^{***}		
			(0.039)		
R^2	0.095	0.072	0.086		

NOTE: Standard errors in parentheses: $^{*}p < .10$, $^{**}p < .05$, and $^{***}p < .01$.

Credit-Market Sentiment & Economic Growth

Sample period: 1929–2013



Subsample Analysis

- Are results robust to excluding the Great Depression and the Great Recession?
  - **Subsample I**: 1952–2013
  - **Subsample II**: 1952–2007
- Estimate our specification using a 40-year rolling window.

Financial Market Sentiment & Economic Growth

Dep. variable: Δy_t; Sample period I: 1952–2013

Regressors	(1)	(2)	(3)	(4)	(5)
$\Delta \hat{s}_t$	-2.805^{***}	.	.	-2.806^{***}	-2.704^{***}
	(0.557)			(0.545)	(0.610)
$\hat{r}_t^M$	.	-0.011	.	-0.01	.
		(0.027)		(0.026)	
$\hat{r}_t^{SP}$	.	.	0.069^{*}	.	0.016
			(0.036)		(0.044)
Δy_{t-1}	0.231	0.126	0.150	0.226	0.234
	(0.156)	(0.132)	(0.129)	(0.165)	(0.159)
R^2	0.104	0.018	0.033	0.106	0.105

NOTE: Standard errors in parentheses: $^{*}p < .10$, $^{**}p < .05$, and $^{***}p < .01$.

Financial Market Sentiment & Economic Growth

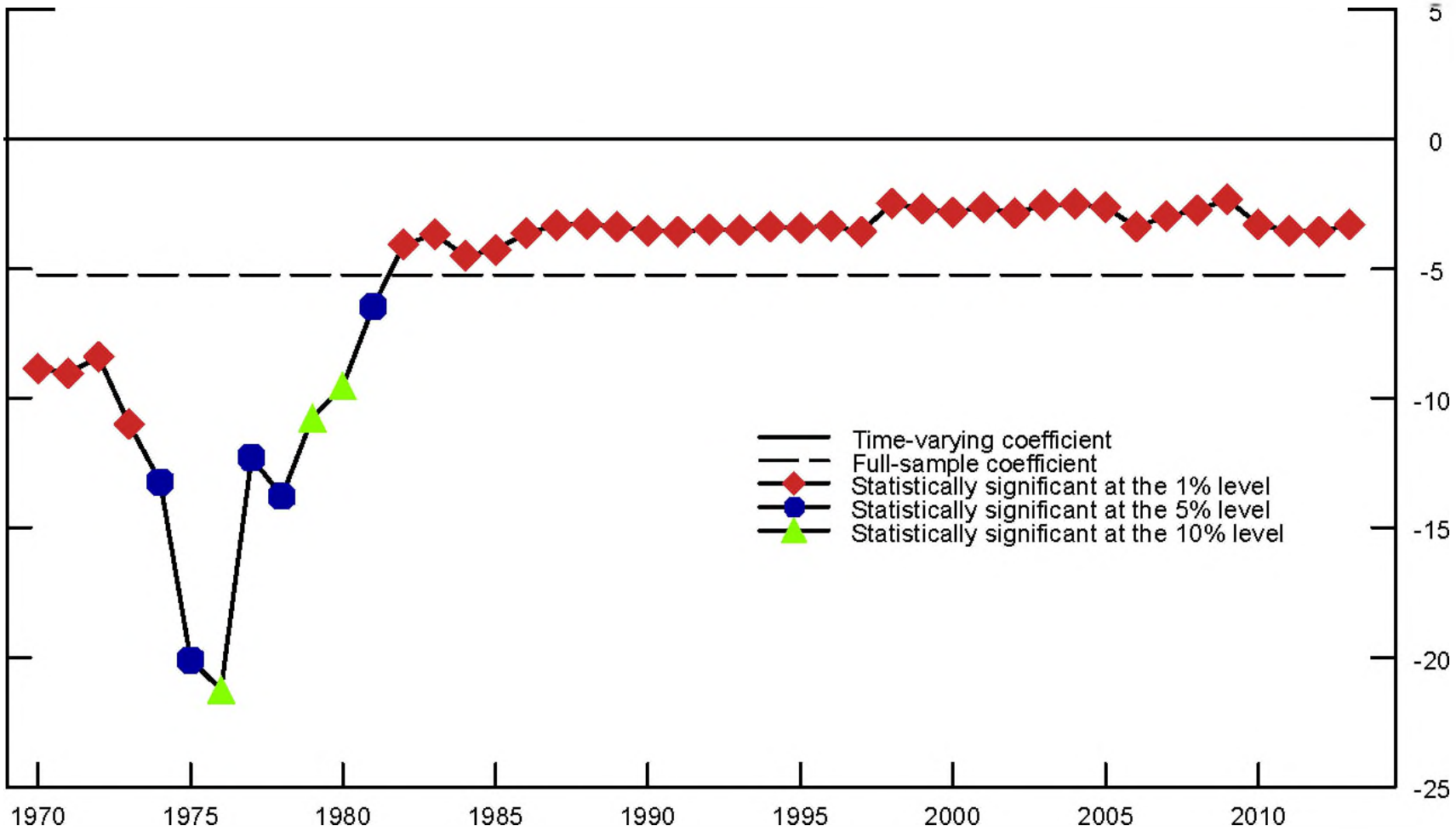
Dep. Variable: Δy_t; Sample Period II: 1952–2007

Regressors	(1)	(2)	(3)	(4)	(5)
$\Delta \hat{s}_t$	-3.031^{***}	.	.	-2.938^{***}	-3.166^{***}
	(0.702)			(0.789)	(0.982)
$\hat{r}_t^M$	.	-0.028	.	-0.023	.
		(0.031)		(0.026)	
$\hat{r}_t^{SP}$	.	.	0.031	.	-0.029
			(0.039)		(0.069)
Δy_{t-1}	0.126	0.034	0.063	0.109	0.118
	(0.126)	(0.134)	(0.127)	(0.143)	(0.142)
R^2	0.107	0.013	0.006	0.114	0.109

NOTE: Standard errors in parentheses: $^{*}p < .10$, $^{**}p < .05$, and $^{***}p < .01$.

Credit-Market Sentiment & Economic Growth

Sample period: 1929–2013; 40-year rolling window estimates



Different Horizons and Activity Measures

- Specification:

$$\begin{aligned} \Delta s_t &= \boldsymbol{\theta}' \mathbf{z}_{t-2} + \nu_t \\ \Delta y_{t+h} &= \beta \Delta \hat{s}_t + \boldsymbol{\gamma}' \mathbf{x}_t + \epsilon_{t+h} \end{aligned}$$

  - Forecast horizon $h = 0, 1, 2$ (years)
  - Measures of economic activity: real GDP (per capita), real BFI, unemployment rate
  - $\mathbf{x}_t = \Delta y_{t-1}$, WW-II and Korean War dummies

- Calculate cumulative effect of a swing in credit-market sentiment—in the fitted value of Δs_t—from P25 to P75 in year t.

Financial Market Sentiment & Economic Activity

Dep. Variable: Δy_{t+h}; **Sample Period: 1929–2013**

	h = 0	**h = 1**	**h = 2**
Real GDP per capita			
$\Delta \hat{s}_t$	-5.237^{***}	-6.205^{***}	-4.051^{*}
	(1.449)	(2.401)	(2.524)
Cumulative effect (pct.)	-1.409^{***}	-3.068^{***}	-4.173^{**}
	(0.390)	(1.125)	(1.835)
Real business fixed investment			
$\Delta \hat{s}_t$	-10.056^{***}	-10.218^{**}	-0.470
	(3.785)	(5.267)	(3.085)
Cumulative effect (pct.)	-2.705^{***}	-5.368^{***}	-5.560^{*}
	(1.018)	(2.050)	(3.333)
Unemployment rate			
$\Delta \hat{s}_t$	2.457^{***}	2.371^{***}	1.512^{*}
	(0.668)	(0.798)	(0.863)
Cumulative effect (pps.)	0.661^{***}	1.277^{***}	1.686^{***}
	(0.180)	(0.373)	(0.599)

NOTE: Standard errors in parentheses: $^{*}p < .10$, $^{**}p < .05$, and $^{***}p < .01$.

Expanding the Measures of Credit-Market Sentiment

- Specification:

$$\begin{aligned} \Delta s_t &= \boldsymbol{\theta}' \mathbf{z}_{t-2} + \nu_t \\ \Delta y_{t+h} &= \beta \Delta \hat{s}_t + \boldsymbol{\gamma}' \mathbf{x}_t + \epsilon_{t+h} \end{aligned}$$

  - Δy_t = log-difference of real GDP (per capita)
  - Δs_t = change in Baa-Treasury spread
  - $\mathbf{x}_t = \Delta y_{t-1}$, WW-II and Korean War dummies

- $\mathbf{z}_{t-2}$: s_{t-2}, $\log \mathrm{HYS}_{t-2}$, and TS_{t-2}
  - Term spread at $t-2$ (TS_{t-2}) helps predict Δs_t.
  - **Implications**: More variation in credit-market sentiment (i.e., $\Delta \hat{s}_t$).

Credit-Market Sentiment & Economic Growth

Dep. Variable: Δy_t; Different Subsamples

	1929–2013		1952–2013		1952–2007	
Regressors	(1)	(2)	(1)	(2)	(1)	(2)
$\Delta \hat{s}_t$	-5.237^{***}	-4.232^{***}	-2.805^{***}	-3.050^{***}	-3.031^{***}	-3.396^{***}
	(1.449)	(1.141)	(0.557)	(1.052)	(0.702)	(1.140)
Δy_{t-1}	0.596^{***}	0.554^{***}	0.231	0.123	0.126	0.030
	(0.126)	(0.111)	(0.156)	(0.148)	(0.126)	(0.120)
R^2	0.398	0.395	0.104	0.178	0.107	0.183
			Auxilliary Forecasting Regressions			
$\log \text{HYS}_{t-2}$	0.077^{***}	0.090^{***}	0.124^{***}	0.125^{***}	0.092^{***}	0.093^{***}
	(0.004)	(0.030)	(0.031)	(0.043)	(0.018)	(0.022)
s_{t-2}	-0.242^{***}	-0.215^{***}	-0.210^{***}	-0.087^{*}	-0.257^{***}	-0.139^{***}
	(0.038)	(0.040)	(0.057)	(0.050)	(0.070)	(0.055)
TS_{t-2}	.	-0.112^{***}	.	-0.161^{***}	.	-0.138^{***}
		(0.041)		(0.040)		(0.034)
R^2	0.095	0.134	0.077	0.107	0.107	0.164

NOTE: Standard errors in parentheses: $^{*}p < .10$, $^{**}p < .05$, and $^{***}p < .01$.

Credit-Market Sentiment & Economic Activity

Dep. Variable: Δy_{t+h}; Sample Period: 1929–2013

	h = 0	h = 1	h = 2
Real GDP per capita			
$\Delta \hat{s}_t$	−4.232***	−5.035**	−3.115
	(1.141)	(2.257)	(2.378)
Cumulative effect (pct.)	−2.197***	−4.881***	−6.700**
	(0.592)	(1.778)	(3.050)
Real business fixed investment			
$\Delta \hat{s}_t$	−10.662***	−10.152***	−0.675
	(1.999)	(2.756)	(2.589)
Cumulative effect (pct.)	−5.535***	−10.714***	−11.271***
	(1.038)	(3.114)	(3.093)
Unemployment rate			
$\Delta \hat{s}_t$	2.468***	2.388***	1.387*
	(0.545)	(0.787)	(0.822)
Cumulative effect (pps.)	1.281***	2.495***	3.224***
	(0.283)	(0.651)	(1.069)

NOTE: Standard errors in parentheses: $^{*}p < .10$, $^{**}p < .05$, and $^{***}p < .01$.

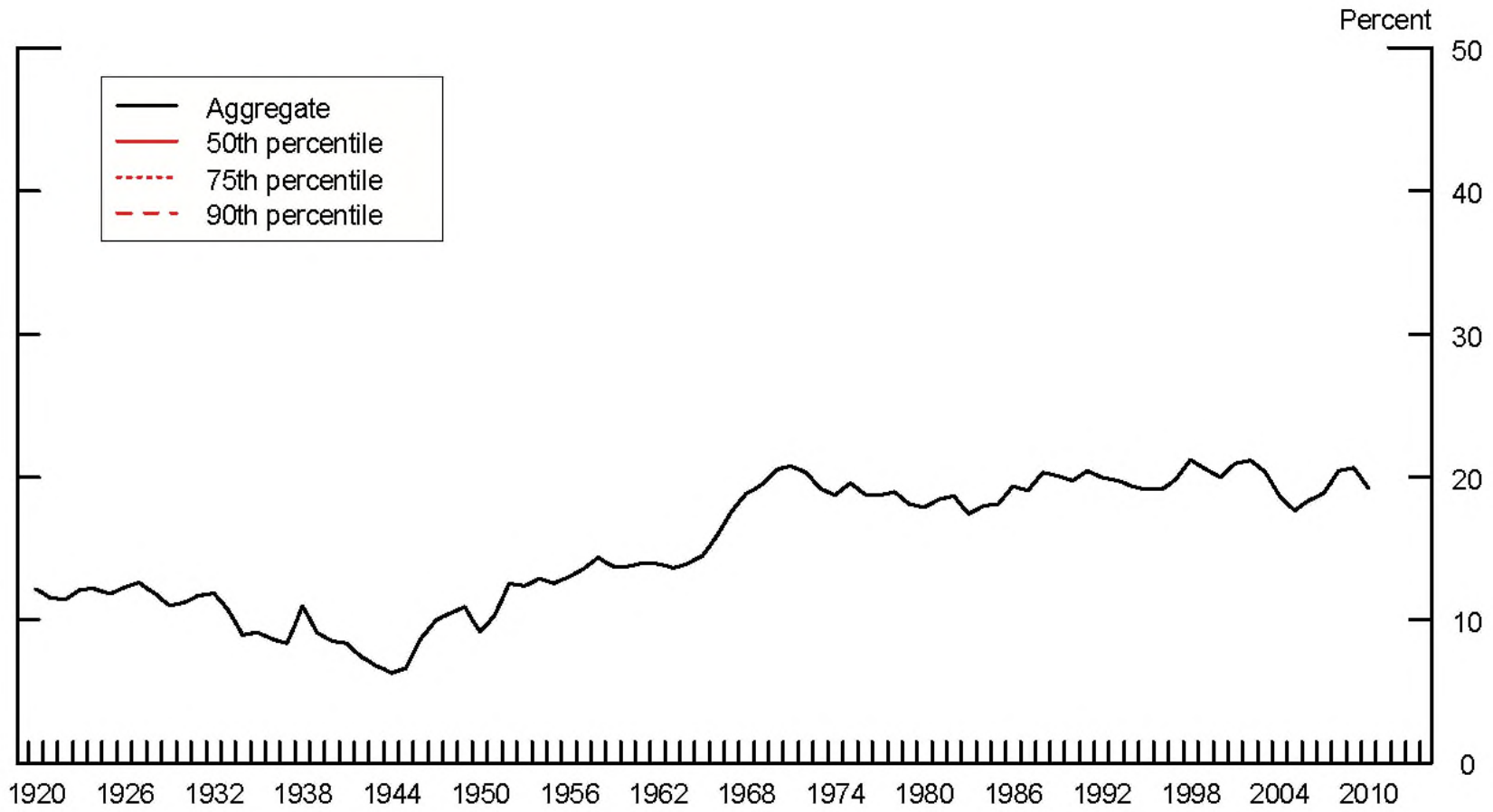
How About Corporate Leverage?

- Does credit-market sentiment forecasts economic activity because of its impact on future credit spreads?
- Do frothy credit-market conditions forecast economic activity because they lead to higher corporate leverage?
- Our approach:
  - **1929–2013**: control for changes in aggregate measures of corporate leverage

    Graham, Leary & Roberts (2014)
  - **1952–2013**: control for changes in leverage at different points of the cross-sectional distribution (i.e., most highly leveraged firms)

Corporate Leverage

Long-Term Debt to Book Assets – U.S. Nonfinancial Corporate Sector



Credit-Market Sentiment, Leverage & Economic Growth

Dep. Variable: Δy_t; Sample Period: 1929–2013

Regressors	(1)	(2)	(3)
$\Delta \hat{s}_t$	-4.315^{***}	-4.320^{***}	-4.306^{***}
	(1.155)	(1.108)	(1.121)
$\Delta \log[\text{LTD/A}]_{t-2}$	0.006	.	.
	(0.029)		
$\Delta \log[\text{TD/A}]_{t-2}$	.	0.006	.
		(0.029)	
$\Delta \log[\text{TL/A}]_{t-2}$	.	.	−0.022
			(0.085)
R^2	0.397	0.396	0.397

NOTE: Standard errors in parentheses: $^{*}p < .10$, $^{**}p < .05$, and $^{***}p < .01$.

Credit-Market Sentiment, Leverage & Economic Growth

Dep. Variable: Δy_t; Sample Period: 1952–2013

Regressors	(1)	(2)	(3)
$\Delta \hat{s}_t$	-3.050^{***}	-3.063^{***}	-3.056^{***}
	(1.043)	(1.019)	(1.084)
P50: $\Delta \log[\text{LTD}/\text{A}]_{t-2}$	-0.000	·	·
	(0.037)		
P75: $\Delta \log[\text{LTD}/\text{A}]_{t-2}$	·	-0.025	·
		(0.051)	
P90: $\Delta \log[\text{LTD}/\text{A}]_{t-2}$	·	·	0.034
			(0.038)
R^2	0.178	0.182	0.184

NOTE: Standard errors in parentheses: $^{*}p < .10$, $^{**}p < .05$, and $^{***}p < .01$.

What About Credit Growth?

- Lagged (5-year) growth in bank credit forecasts—with a negative sign—output growth.

  Schularick & Taylor (2012); Jordá, Schularick & Taylor (2013)

- But in a "horse race," our credit-market sentiment proxies drive out bank credit growth.

- Interpretation:
  - Maybe more about measurement than different mechanisms.
  - Though suggestive of disruptions in not just bank-intermediated credit markets but also in arms' length credit markets.

Credit-Market Sentiment, Credit & Economic Growth

Dep. Variable: Δy_t; Sample Period: 1929–2013

Regressors	(1)	(2)	(3)	(4)
$\Delta \hat{s}_t$	.	.	-2.986^{***}	-4.817^{***}
			(0.697)	(1.835)
$\Delta_5 \log \mathrm{BC}_{t-1}$	-0.489^{**}	.	-0.372^{*}	.
	(0.215)		(0.215)	
$\Delta_5 \log \mathrm{BL}_{t-1}$	.	-0.143^{**}	.	0.065
		(0.064)		(0.085)
Δy_{t-1}	0.453^{***}	0.511^{***}	0.492^{***}	0.560^{***}
	(0.108)	(0.093)	(0.114)	(0.119)
R^2	0.393	0.333	0.430	0.399

NOTE: Standard errors in parentheses: $^{*}p < .10$, $^{**}p < .05$, and $^{***}p < .01$.

Useful Framework

- A simple model of investment and financing decision:

$$\max_{I,D} \quad \theta f(I) - \delta D - I\frac{\gamma}{2}(d - d^*)^2 \quad (d = D/I)$$
$$\text{s.t.} \quad I = D + E$$

  - δD = total premium on debt finance
  - $\frac{\gamma}{2}(d - d^*)^2$ = cost of deviating from "optimal" capital structure d^*

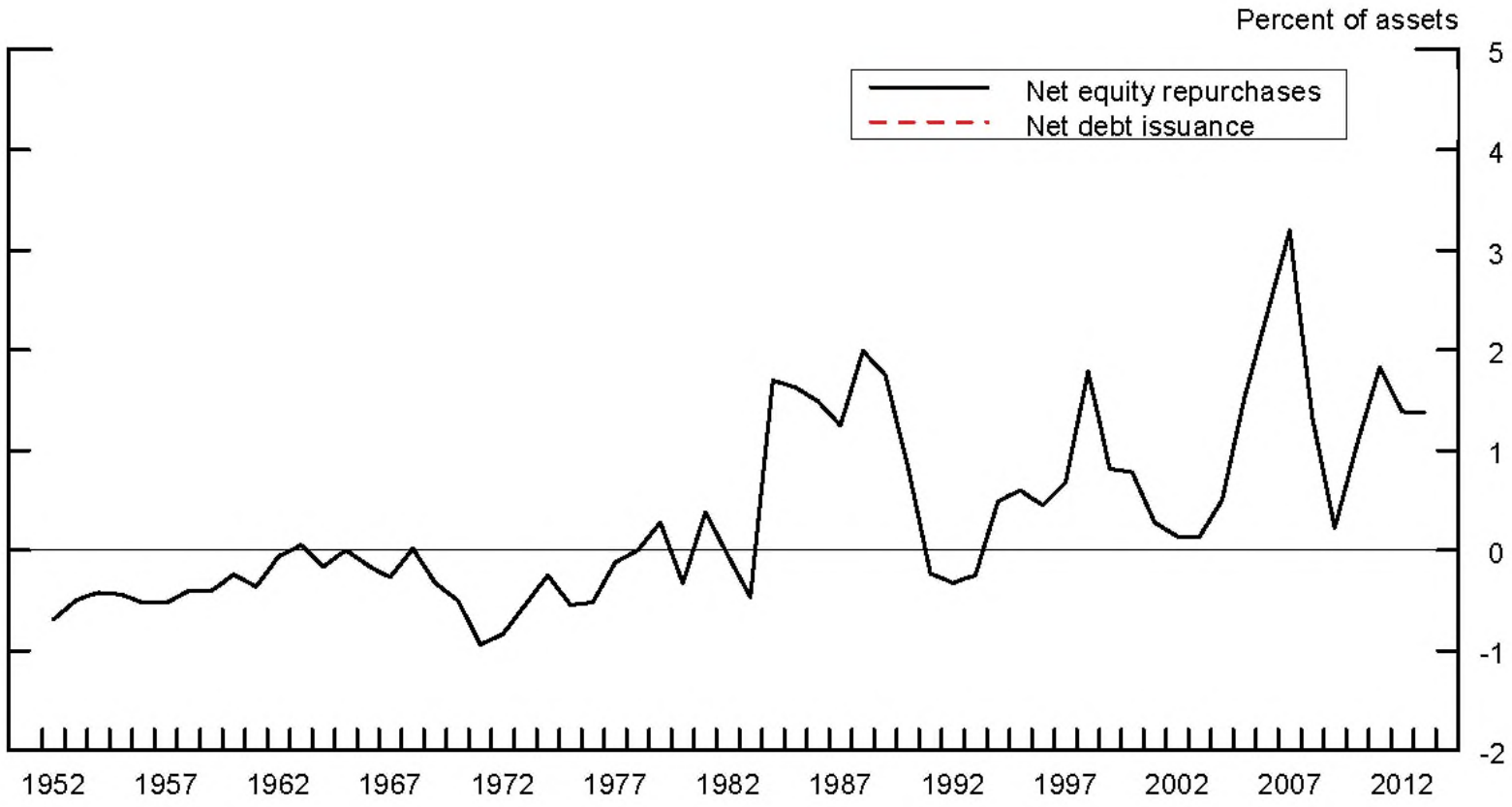
- Optimal investment and capital structure:

$$\begin{aligned} d - d^* &= -\delta/\gamma \\ \theta f'(I) &= \delta d - \delta^2/2\gamma \end{aligned}$$

- Implications:
  (a) $I \downarrow$ because either $\theta \downarrow$ or $\delta \uparrow$.
  (b) $\delta \uparrow \Rightarrow D/E \downarrow$ and $I \downarrow$, but $\theta \uparrow$ has no effect on leverage—only $I \downarrow$.
  (c) $D \downarrow$, $E \uparrow$ and $I \downarrow \Rightarrow \delta \uparrow$.

Financing Mix

U.S. Nonfinancial Corporate Sector



Credit-Market Sentiment & Corporate Financing Mix

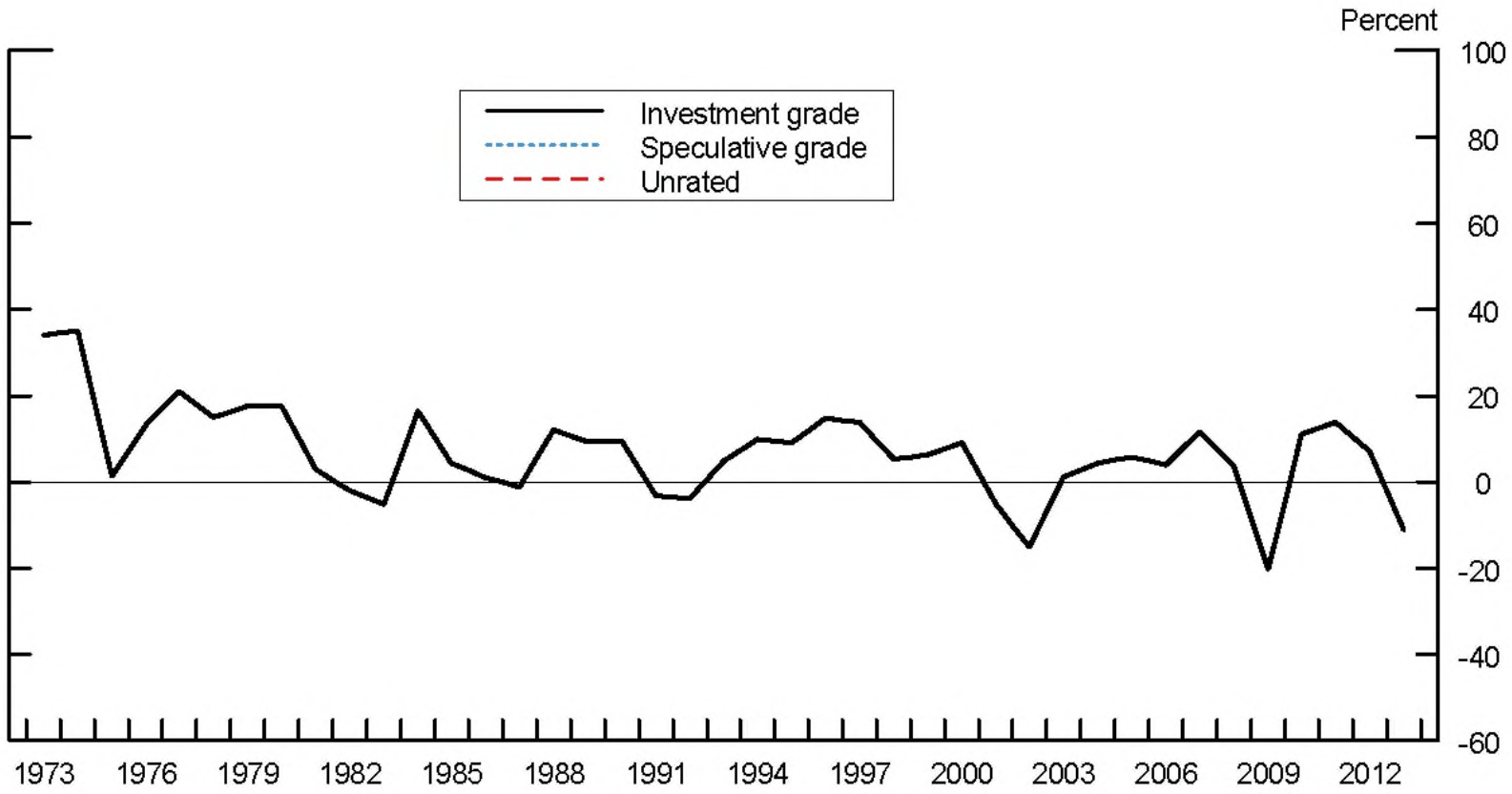
Dep. Variable: $[F/A]_t$; Different Subsamples

	F: Net Equity Repurchases		F: Net Debt Issuance	
Regressors	**1952–2013**	**1985–2013**	**1952–2013**	**1985–2013**
$\Delta\hat{s}_t$	-0.927^{***}	-1.063^{***}	-0.968^{***}	-1.049^{**}
	(0.326)	(0.409)	(0.258)	(0.471)
$[F/A]_{t-1}$	0.684^{***}	0.775^{***}	0.682^{***}	0.715^{***}
	(0.045)	(0.068)	(0.071)	(0.098)
$\log[D/P]_t$	-0.073	-0.512^{**}	.	.
	(0.186)	(0.243)		
$\Delta i_t^{(10y)}$	.	.	-0.144^{***}	-0.125
			(0.044)	(0.128)
R^2	0.692	0.523	0.542	0.525

NOTE: Standard errors in parentheses: $^{*}p < .10$, $^{**}p < .05$, and $^{***}p < .01$.

Growth of Capital Expenditures by Firm Type

U.S. Nonfinancial Corporate Sector



Credit-Market Sentiment & Corporate Bond Issuance

Dep. Variable: $\log[\mathrm{ISS}/I]_t$; **Sample Period: 1973–2013**

	High Yield		Investment Grade	
Regressors	(1)	(2)	(1)	(2)
$\Delta\hat{s}_t$	-66.772^{***}	-74.473^{***}	51.392^{***}	40.141^{***}
	(17.135)	(21.825)	(16.249)	(12.475)
$\log[\mathrm{ISS}/I]_{t-1}$	0.202^{***}	0.103	0.823^{***}	0.795^{***}
	(0.060)	(0.069)	(0.118)	(0.109)
R^2	0.177	0.264	0.550	0.550

NOTE: Standard errors in parentheses: $^{*}p < .10$, $^{**}p < .05$, and $^{***}p < .01$.

Credit-Market Sentiment & Corporate Bond Issuance

- Why does HY bond issuance react more to credit-market sentiment?
- **Possibility**: The lower the credit quality, the more price-to-fundamental value moves in response to a credit-sentiment shock:
  - Aa-rated bonds are never too "mispriced," but Caa-rated bonds can be.
  - Issuers respond to perceived mispricing.

Cross-Sectional Investment Implications

- Panel-data investment specification:

$$\Delta \log I_{jt} = \alpha_1 \Delta \log Y_{jt} + \alpha_2 r^M_{jt} + \beta \Delta \hat{s}_t + \gamma \Delta \log \mathrm{IP}^I_t + \mu_j + \epsilon_{jt}$$

  - I_{jt} = real capital expendtitures of firm j
  - Y_{jt} = real sales of firm j
  - r^M_{jt} = (log) equity return of firm j
  - IP^I_t = industry-level (3-digit NAICS) industrial production

- Regression coefficients are allowed to differ between firms of different credit quality ($\mathrm{RTG}_{j,t-1}$):
  (a) Unrated = no credit rating
  (b) All HY (high yield) = Ba1, Ba2, Ba3, B1, B2, B3, Caa1, Caa2, Caa3, Ca
  (c) Low IG (lower investment grade)= A1, A2, A3, Baa1, Baa2, Baa3
  (d) High IG (high investment grade) = Aaa, Aa1, Aa2, Aa3

Credit-Market Sentiment and Investment

Dep. Variable: $\Delta \log I_{jt}$; **Sample Period: 1973–2013**; **No. of Firms = 5,553**

Regressors	**Unrated**	**All HY**	**Low IG**	**High IG**
$\Delta \hat{s}_t \times \text{RTG}_{j,t-1}$	-8.154^{***}	-6.684^{*}	-6.180^{**}	0.508
	(2.899)	(3.954)	(2.520)	(2.534)
$\Delta \log Y_{jt} \times \text{RTG}_{j,t-1}$	0.660^{***}	0.911^{***}	0.895^{***}	1.007^{***}
	(0.037)	(0.062)	(0.061)	(0.109)
$r_{jt}^{M} \times \text{RTG}_{j,t-1}$	0.067^{***}	0.037	-0.038	-0.024
	(0.022)	(0.030)	(0.024)	(0.039)
$\Delta \log IP_t^I \times \text{RTG}_{j,t-1}$	0.324^{***}	0.086	-0.082	0.114
	(0.079)	(0.124)	(0.121)	(0.160)
$\Pr > W$	0.008	0.035	0.005	
Obs.	52,901	4,804	5,179	1,021

NOTE: Standard errors in parentheses: $^{*}p < .10$, $^{**}p < .05$, and $^{***}p < .01$.

Summary

- Buoyant credit-market sentiment in year $t-2$ predicts significant contraction in economic activity in years t through $t+2$.
- We've argued for a causal mechanism based on reversion in credit spreads and accompanying contraction in supply of credit.
  - Response of financing mix to changes in credit-market sentiment.
  - Response of HY vs. IG bond issuance to changes in credit-market sentiment.
  - Differences in sensitivity of investment across of firms of different credit quality to changes in credit-market sentiment.

But What Drives Changes in Sentiment?

- Some evidence that monetary policy plays a role via "reaching-for-yield" mechanism:
  - Monetary policy and term premiums
    Hanson & Stein (2014)
  - Monetary policy and credit spreads
    Gertler & Karadi (2015); Gilchrist, López-Salido & Zakrajšek (2015)
  - Monetary policy and banks' "risk appetite"
    Jiménez et al. (2014)

Implications for Monetary Policy

- Central bank's objective function:

$$\min \; E_t \sum_{j=t}^{\infty} \beta^{j-t} \left(U_j - U^* \right)^2$$

- **Tradeoff**: easy policy today helps bring U_t closer to U^*, but drives $E\left[U_{t+k}\right]$ further away.
- How much credit-market sentiment should influence policy depends on the current gap $\left(U_t - U^*\right)$:
  - Maybe not much when $U_t = 8.0\%$.
  - Maybe a good bit more when $U_t = 5.8\%$.