200 Years of Sovereign Haircuts
(research in progress)

Josefin Meyer
Univ. of Munich
& Sciences Po

Carmen M. Reinhart
Harvard University
& NBER, CEPR

Christoph Trebesch
Univ. of Munich
& CEPR

47th Konstanz Seminar on
Monetary Theory and Monetary Policy
May 12th, 2016

Motivation

Why does sovereign debt exist? Not obvious:

- Limited enforcement
- No collateral

Classic answer: reputation and the cost of default (costs: financial, economic, political and legal, see Panizza et al. 2009)

Insight in this paper: sovereign debt exists because it is a lucrative investment (here: we abstract from the cost of default)

Our research agenda

We are creating a new archive of **external** debt, default, and haircuts, worldwide, and for >200 years (1800-2014)

- – Census of external sovereign debt restructurings, haircuts
- – Process of default and restructurings (start/end, terms)
- – Expanded dataset of debt/GDP (external, domestic)

Three research goals:

1. Study role of debt, default and relief for macroeconomy. How best to resolve debt overhang and debt crises? Consider private *and* official debt relief
2. Understanding capital flows: "new" lending vs. evergreening
3. Sovereign debt as an asset class: investor losses and returns in the very long run. How did creditors fare?

This paper

> **Under which circumstances did creditors suffer losses on sovereign debt?**

- – Move away from simple, binary coding of default
- – Magnitude of losses (LGD) matters. Relevant for investors, risk pricing and financial stability
- – First paper to compute losses in the short-run (haircuts) and long-run (returns)

Why 200 years?

- – Debt crises are rare events, e.g. in advanced economies
- – Learn from past experiences, e.g. in crisis resolution
- – Sovereign bonds are central today, just as pre-1945

Haircuts, restructurings, bonds, 1815-2013

New database expands Sturzenegger/Zettelmeyer (2006), Reinhart/Rogoff (2009), Cruces/Trebesch (2013), Reinhart/Trebesch (2015)

Sample:

- Census of sovereign restructurings & haircuts: 1815-2013
- Focus on <u>external private debt</u> (to foreign banks/bondholders)
- In total: >300 restructurings in >80 countries
- Details on more than 1000 defaulted bonds
- Work in progress: data on non-defaulted bonds, prices

Main sources:

- Reports of creditor organisations of UK, US, France:
  CFB (1876-1986), FBPC (1934-1964/67), ANPVM (1935-1970)
- Manuals: Moody's (1926-1970), Kimber's (1921-1934), Fenn's Compendium (1837, 1874, 1876, 1869, 1883)
- Dozens of additional country sources, agreement contracts, etc

Main take aways (so far)

1) There is a large variation in haircut size.
   Average: 40-50% over the past 200 years

2) Debt repudiation and full defaults are <u>very</u> rare.
   "Recontracting" (Bulow/Rogoff) is the norm

3) Haircuts are "debt booms gone bust"

4) Investor returns on defaulted bonds (ex-post) are >0
   → despite high haircuts, creditors do not fare badly

Stylized Fact 1:

There is a large variation in haircut size
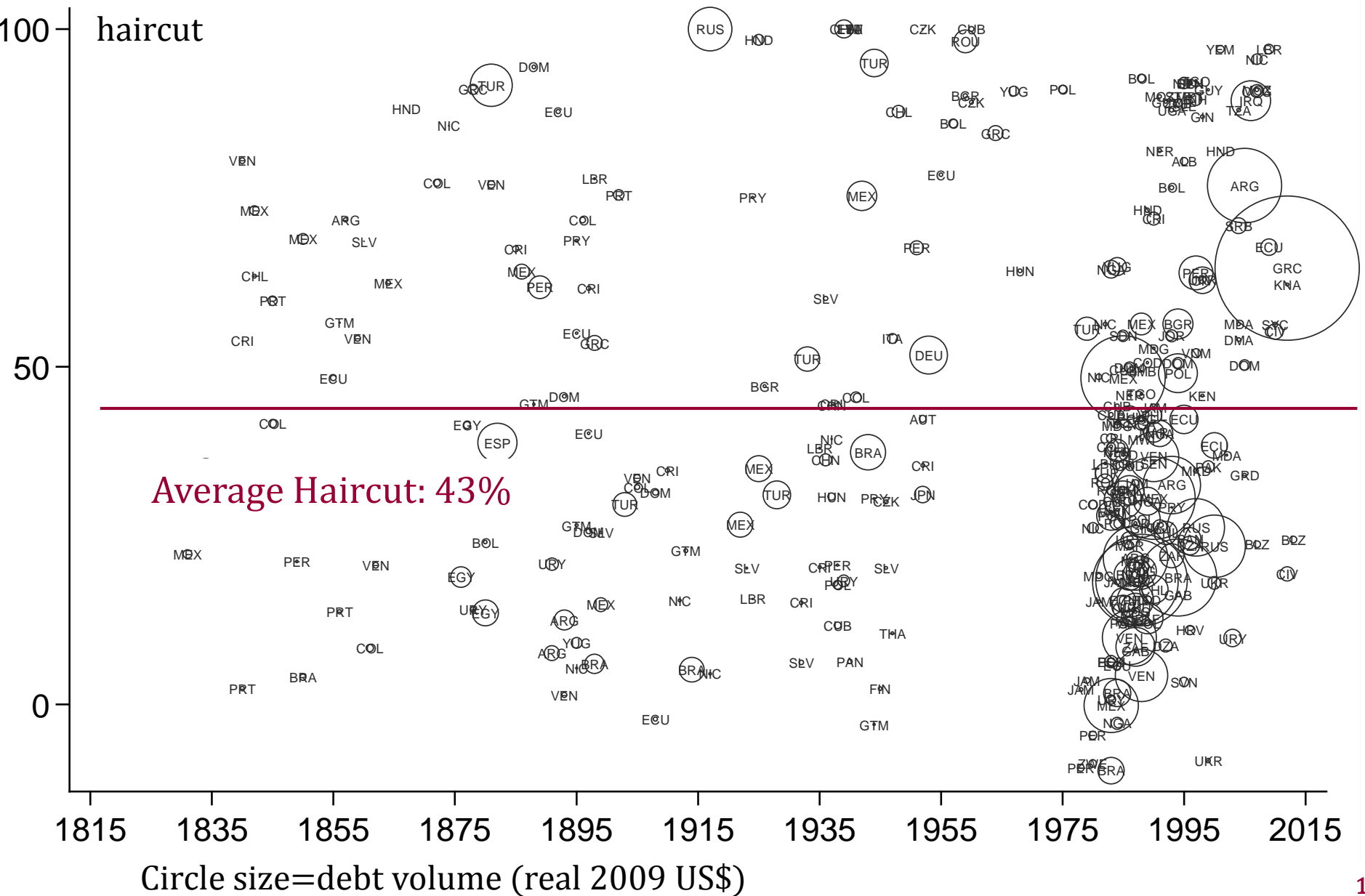
Computing haircuts

Sturzenegger-Zettelmeyer Approach:

$$H_{SZ}{}_t^i = 1 - \frac{\text{Present Value of } New \text{ Debt } \left(r_t^i\right)}{\text{Present Value of } Old \text{ Debt } \left(r_t^i\right)}$$

Discount rate varies by time and country → "exit yield" from secondary bond markets

Alternative:

- Face Value Haircut ("Write Offs")–ignores maturity extension

Haircuts (Cruces/Trebesch): 1970-2014

100 — haircut

Average Haircut: 37%

50 —

0 —

1815 1835 1855 1875 1895 1915 1935 1955 1975 1995 2015

Circle size=debt volume (real 2009 US$)

Full sample: haircuts 1820-2014

Circle size=debt volume (real 2009 US$)

Average Haircut: 43%

Haircuts: summary stats

High vs. Low haircuts:
Cut at the median of 37%

	Cases	Mean	Median	SD	Min	Max
Full Sample (1815-2014)						
Haircut (SZ - main measure)	300	43	37	29	-10	100
Face Value Reduction	300	21	0	31	0	98
Market Haircut	300	49	46	28	-10	100
Historical haircuts (1815-1970) - role of discount rate:						
Market yields (main measure)	128	45	41	31	-3	100
Upper bound (10% interest)	128	48	43	30	-8	100
Lower bound (risk free rate)	128	32	23	34	-43	100
By Era						
Old bond era (1815-1970)	128	45	41	31	-3	100
1815-1869	23	46	54	26	2	88
1870-1920	49	42	35	30	-2	100
1921-1970	56	50	43	34	-3	100
Bank Lending (1971-1997)	138	36	31	26	-10	93
Modern Bond Era (1998-2014)	34	57	59	28	-8	97

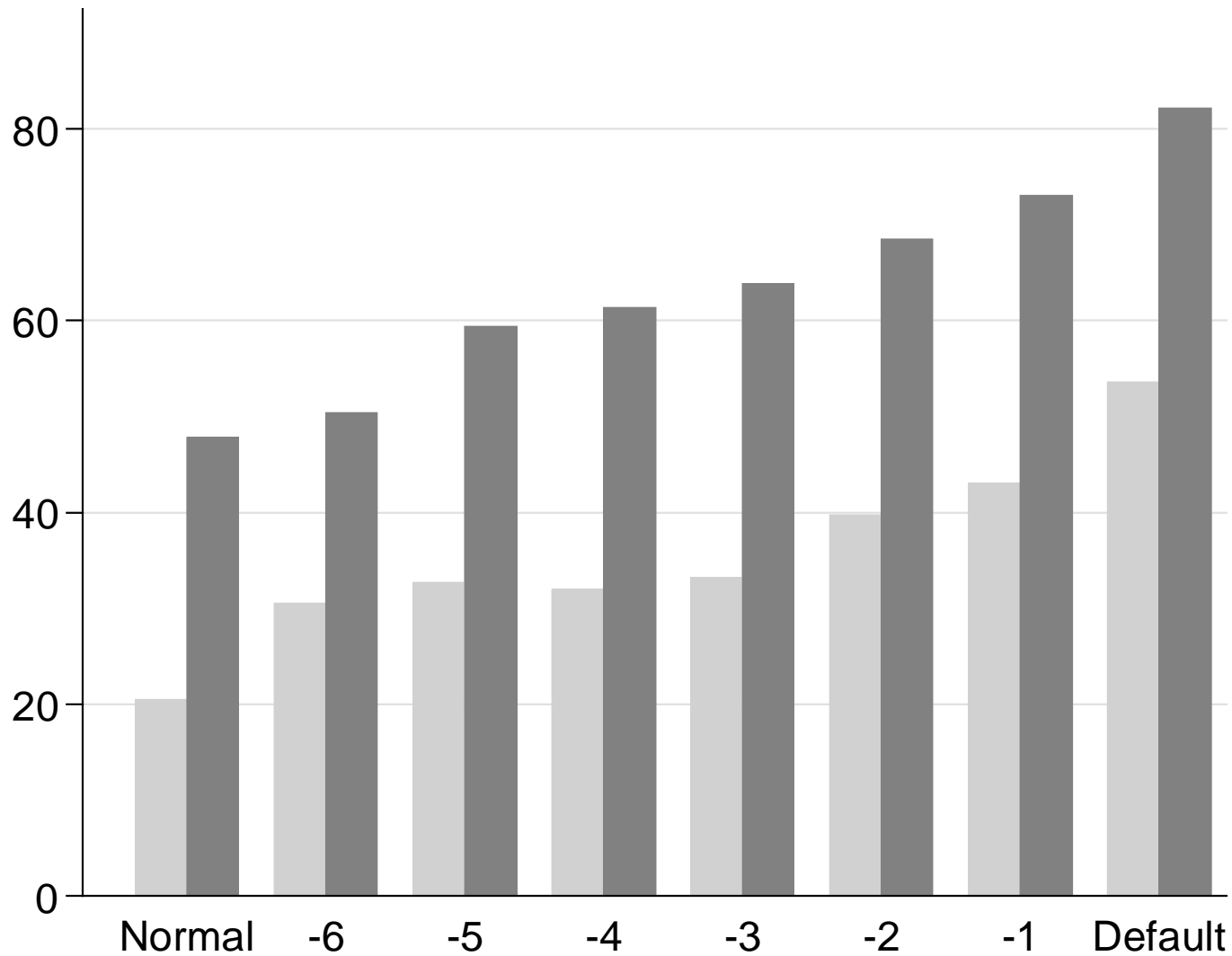# What explains the variation in haircuts?

Main correlates of haircut size:

1) Debt/GDP
2) Output disasters (GDP decline peak to through)
3) Delays (default duration)
4) Revolutions: odious debt cases (rare)

Stylized Fact 2:
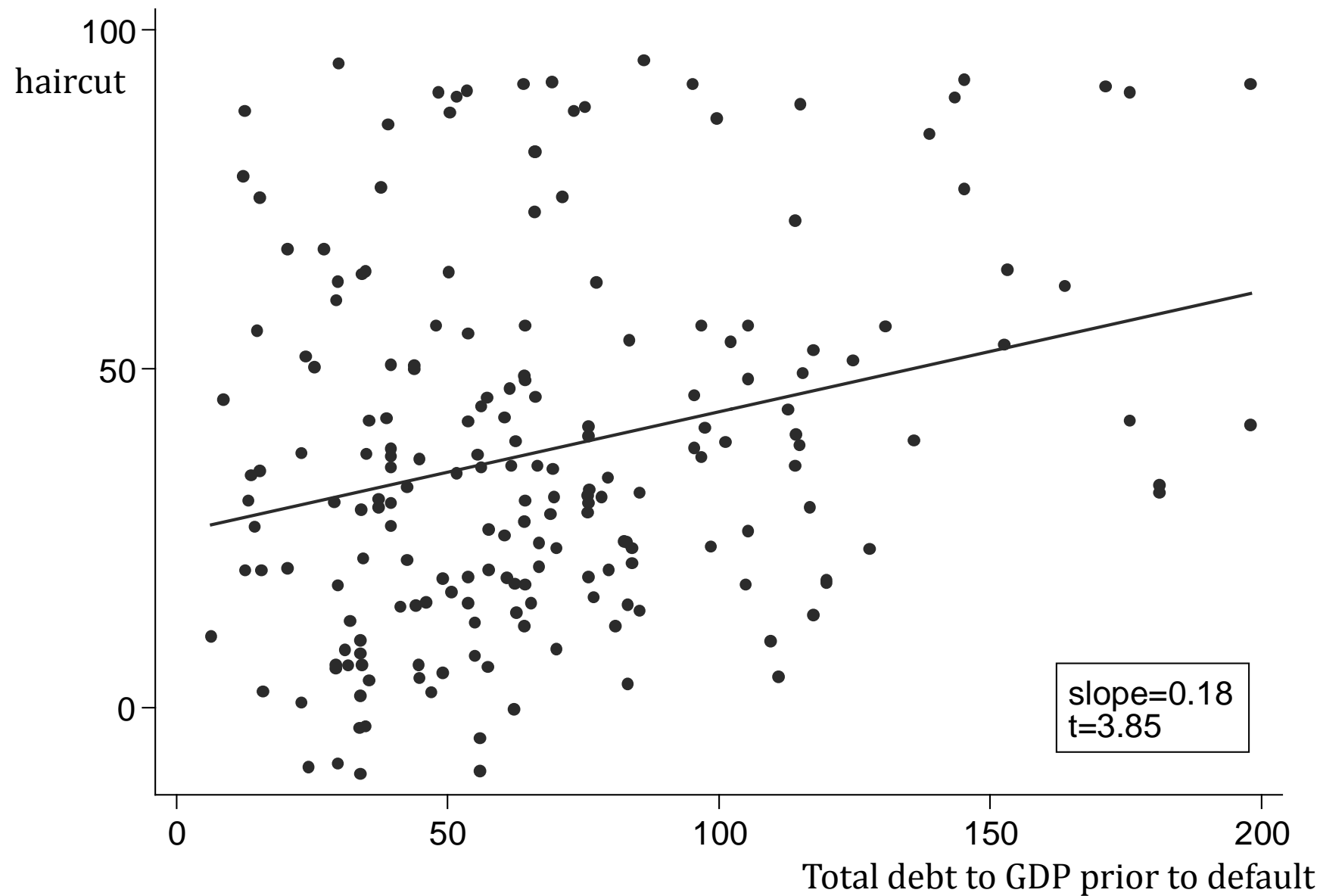
Sovereign haircuts are debt booms gone bust

→ Debt ratios and debt stocks are a good predictor of both default and haircut size

Debt to GDP (%) – before default

Legend: Average external debt to GDP (light gray), Average total debt to GDP in % (dark gray)

Categories: Normal, -6, -5, -4, -3, -2, -1, Default

Haircuts & Debt/GDP before default
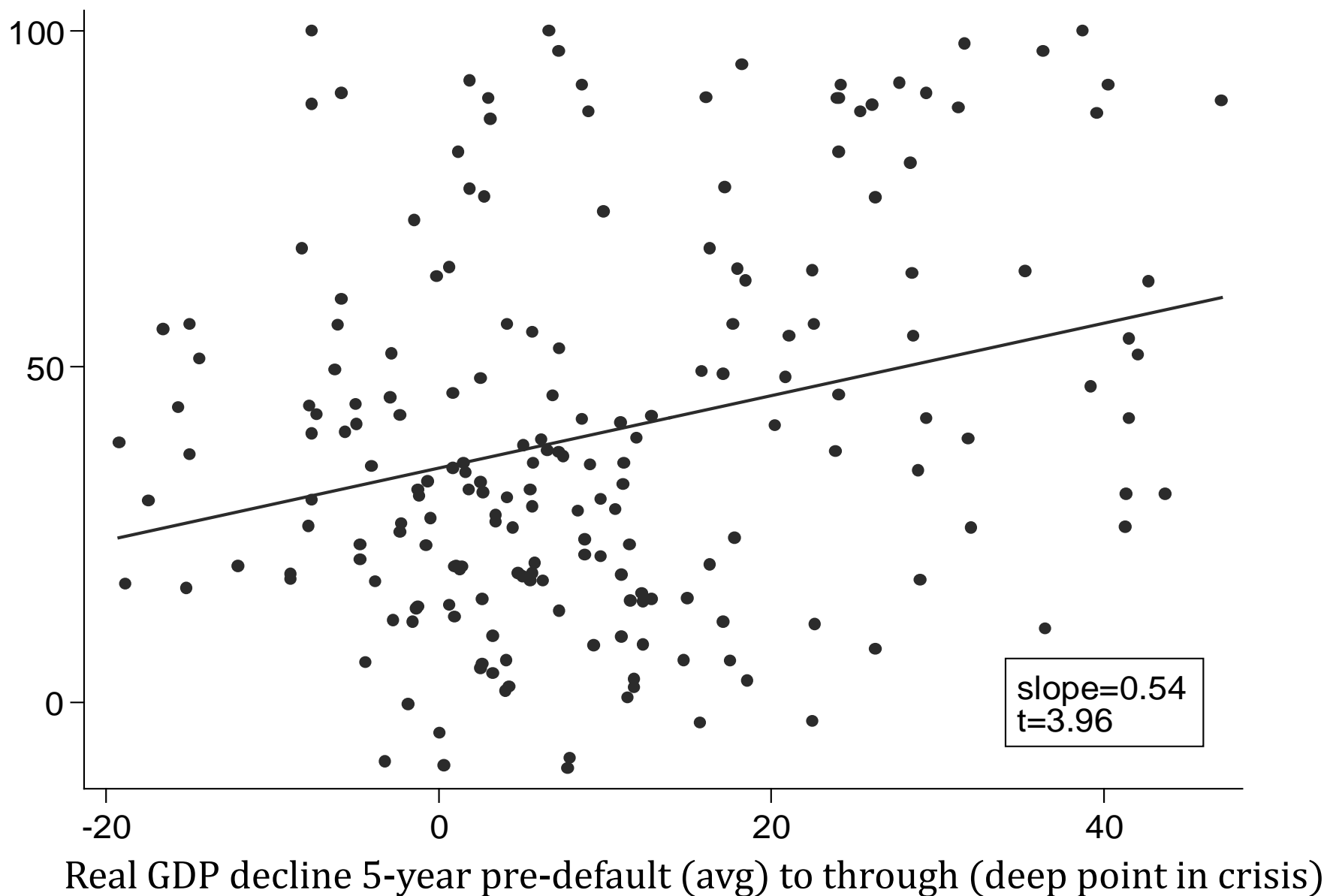

slope=0.18
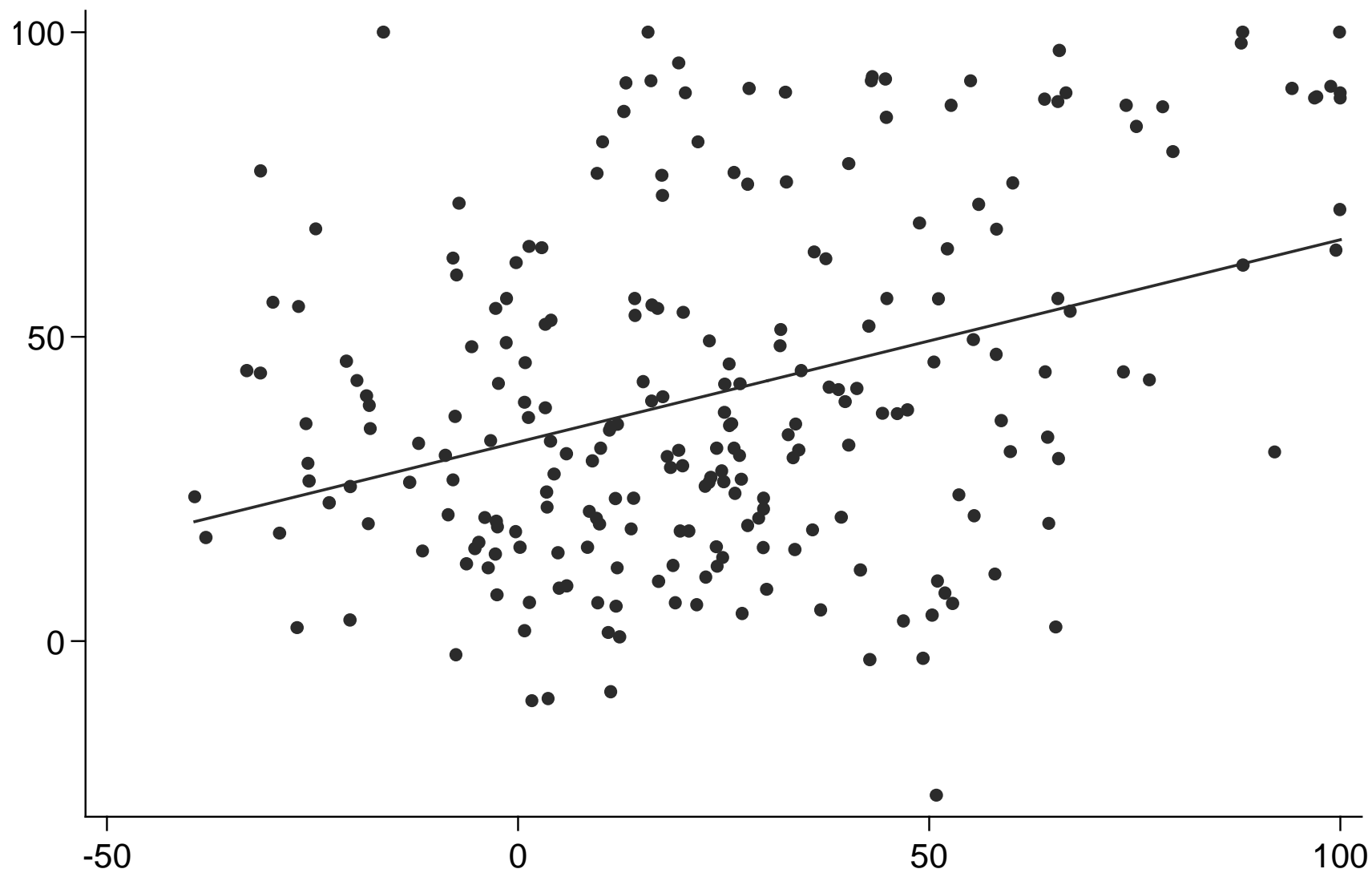t=3.85

haircut (y-axis), Total debt to GDP prior to default (x-axis)

Stylized Fact 3:

Haircuts and crisis severity (output decline) are closely correlated

Haircuts & GDP decline (real p.c., in %)

slope=0.54
t=3.96

Real GDP decline 5-year pre-default (avg) to through (deep point in crisis)
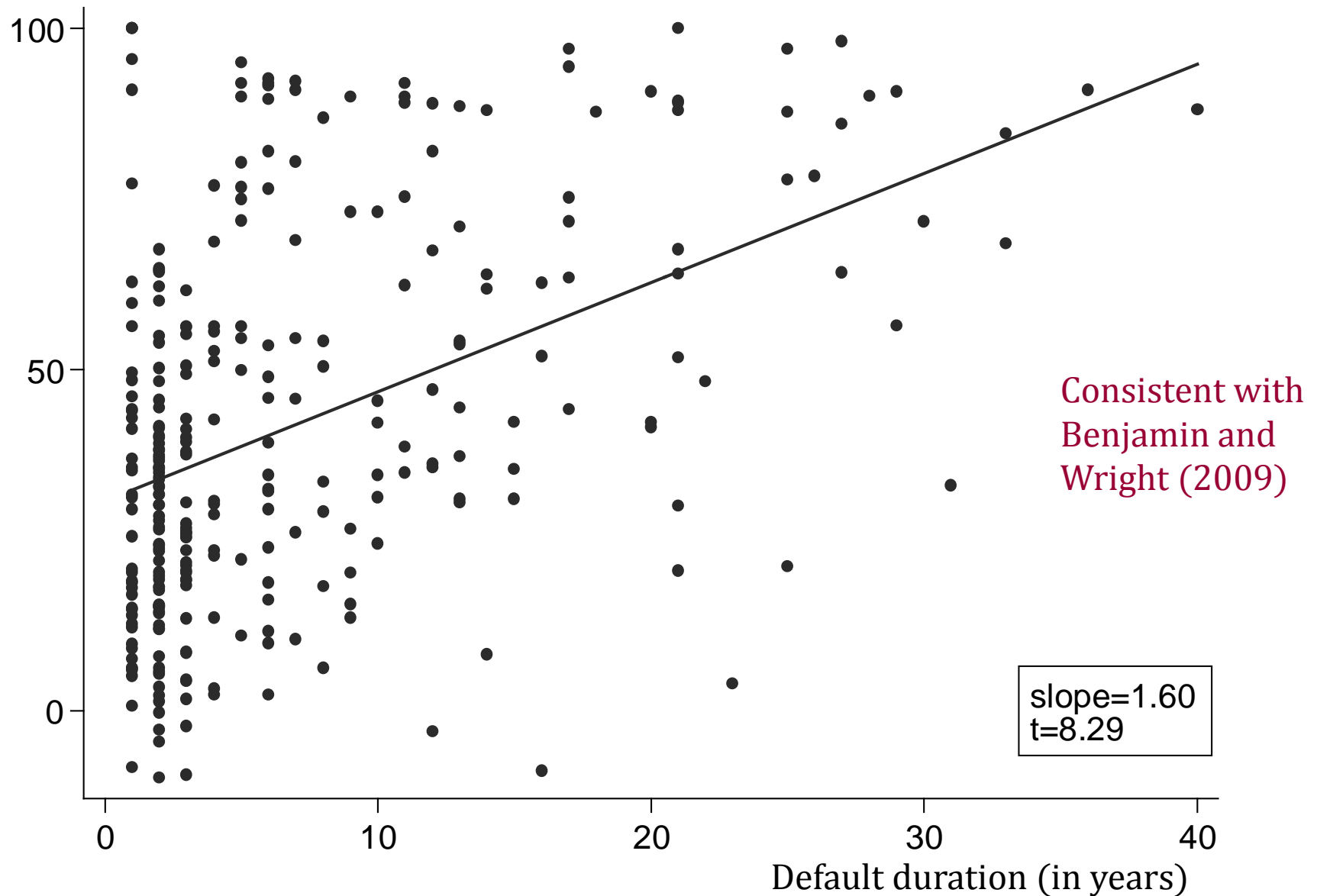
Haircuts & export decline (real, in %)

Real Export decline 5-year pre-default (avg) to through (deep point in crisis)

Stylized Fact 4:

Longer defaults see higher haircuts

Haircuts and delay (default duration in years)

Consistent with Benjamin and Wright (2009)

slope=1.60
t=8.29

Default duration (in years)

Delays (average by era) – high vs. low haircuts

Dark bars: high haircut cases (>37%)

Default duration in years

Stylized Fact 5:

VERY few cases of outright repudiation

Worst defaults – repudiation in history

Country	Default	Amount in m US$ (real 2009 val.)	Context
Greece	1826	1,185	Repudiation after independence
Portugal	1833	634	Repudiation after the Portuguese Civil War
Mexico	1866	1,941	Repudiation on Maximilian I debt
Russia	1917	22,325	Lenin - full repudiation in 1917
China	1938	3,851	Mao - full repudiation after 1949
Cuba	1960	n.a.	Castro revolution

Macro analysis: correlates of haircuts

Dependent variable:	Aggregate Haircuts						
	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) Country FE	(6) Decade FE	(7) Country + Decade FE
Debt to GDP (pre-default)	0.09***	0.07**	0.06	0.06	-0.03	0.07**	0.00
	(0.01)	(0.03)	(0.04)	(0.04)	(0.04)	(0.03)	(0.04)
GDP p.c., real, logs (pre-default)		-9.52***	-7.92***	-8.36***	4.17	-9.39***	3.42
		(2.66)	(2.37)	(2.40)	(4.77)	(2.33)	(13.43)
GDP decline/trough (% decline)			0.27*	0.32**	0.01	0.33**	0.01
			(0.15)	(0.16)	(0.20)	(0.14)	(0.21)
Default duration (years)			1.50***	1.31***	1.91***	1.13***	1.72***
			(0.27)	(0.30)	(0.45)	(0.41)	(0.59)
Odious debt cases				21.54**	33.76*	20.67*	32.38*
				(9.32)	(17.81)	(11.79)	(17.83)
Constant	31.52***	-25.42	-26.07*	-27.98*	33.38	-32.45	42.73
	(2.61)	(15.99)	(14.63)	(14.75)	(34.06)	(25.92)	(88.38)
Country Fixed Effects	No	No	No	No	**Yes**	No	**Yes**
Decade Fixed Effects	No	No	No	No	No	**Yes**	**Yes**
Observations	199	178	164	164	164	164	164
R-squared	0.084	0.112	0.312	0.325	0.694	0.488	0.782

Robust standard errors in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Stylized Fact 6 (micro level data):

Creditors achieve positive returns, despite defaults and haircuts

Micro analysis: returns

Internal Rates of Return as in Lindert and Morton (1989):

$$0 = -L_0 + \sum_{t=0}^{T} \frac{S_t}{(1+\gamma)^t}$$

IRR represents the discount rate γ so that NPV=0

with

L_0 lending amount (issuance price)
T total maturity period in years
S_t nominal debt service in year t

Perspective of a "buy and hold" investor (no prices)
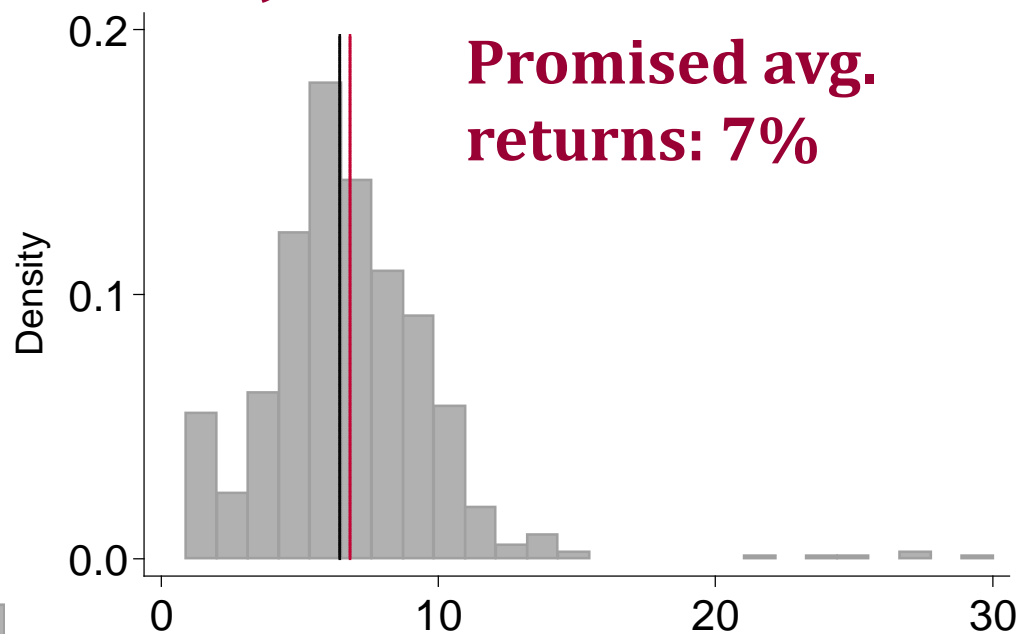
Micro analysis: summary stats (bond level)

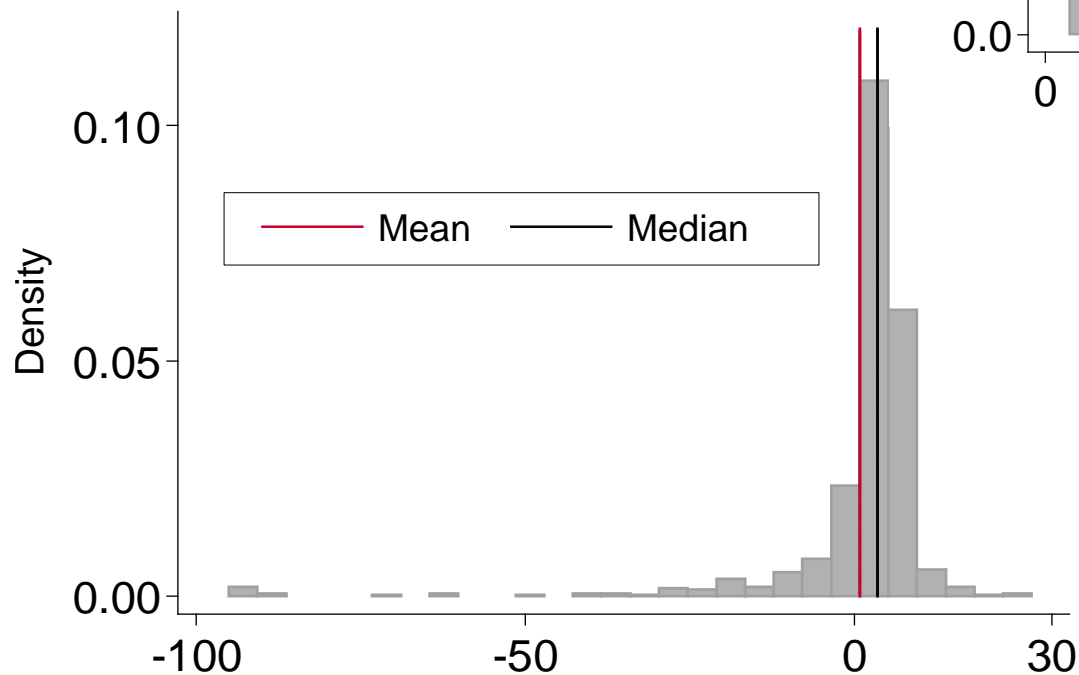|	Bonds	Mean	Median	SD	Min	Max
Total sample: 1820 -2012						
Haircut (in %)	680	49	49	29	-20	100
Realized return (ex-post, in %)	680	1	4	13	-95	27
Promised return (ex-ante in %)	680	7	6	3	1	30

→ Returns look less dramatic than haircuts

Reason: returns account for pre-default payments

Defaulted bonds: promised vs. realized returns, nominal (1820-2012)
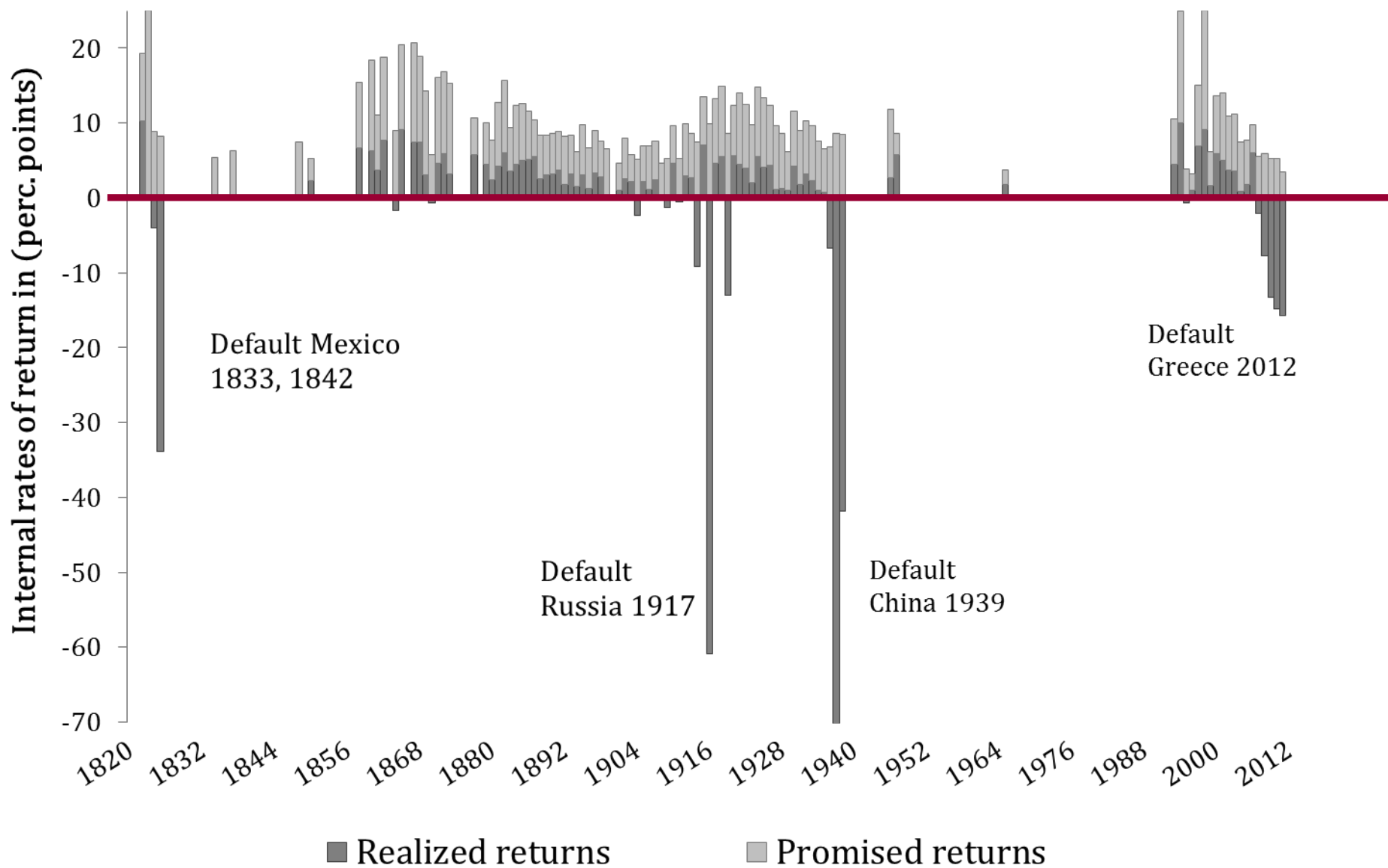
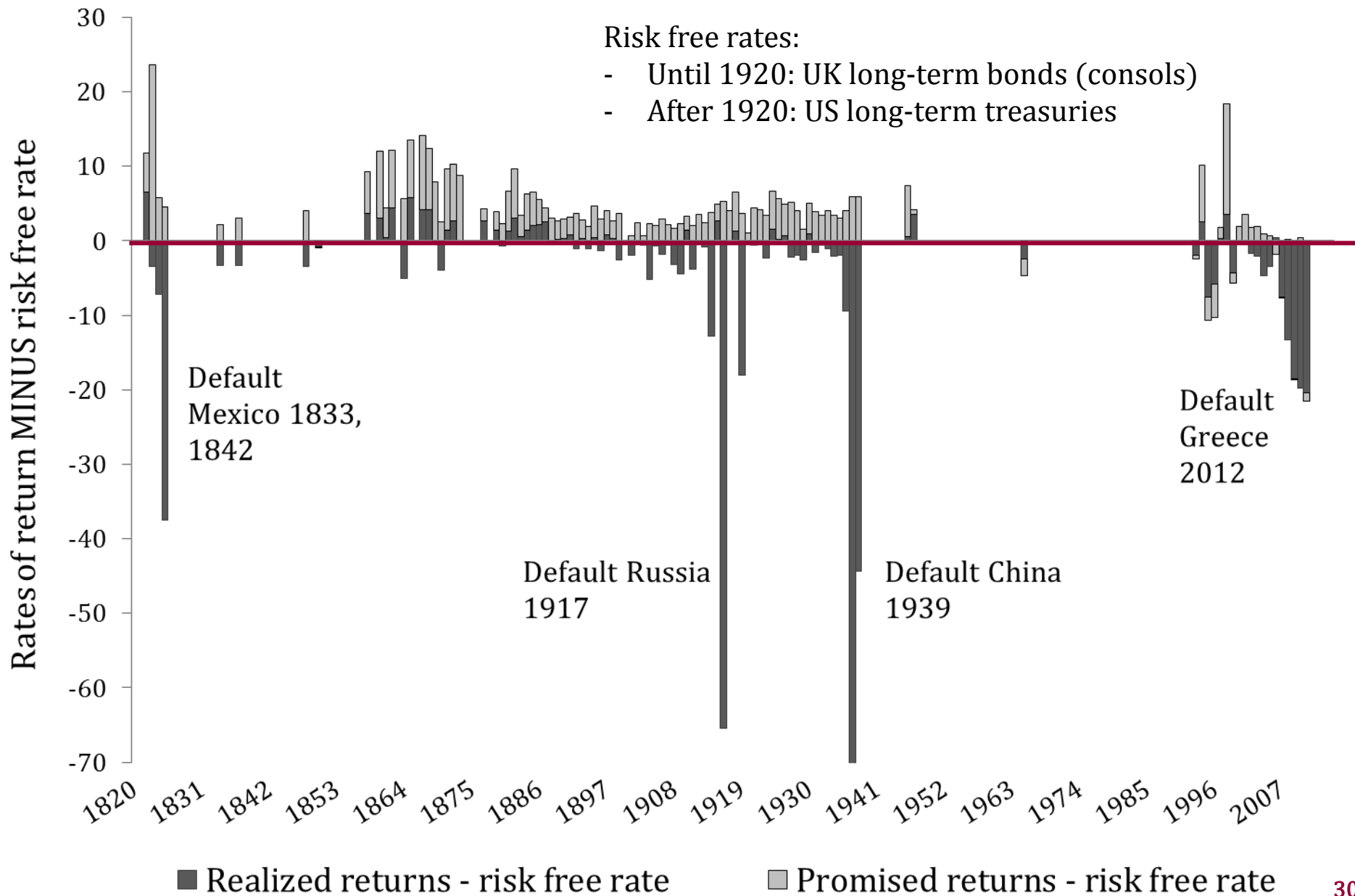Realized returns all bonds: ca. 4%, see Lindert/Morton (1989), Eichengreen/Portes (1991)

Promised avg. returns: 7%

Realized average returns: 1%, despite default

Promised and realized returns (1820-2012)

Benchmarking to risk-free rate (UK or US yields)

Risk free rates:
- Until 1920: UK long-term bonds (consols)
- After 1920: US long-term treasuries

Default Mexico 1833, 1842

Default Russia 1917

Default China 1939

Default Greece 2012

Rates of return MINUS risk free rate

■ Realized returns - risk free rate   ☐ Promised returns - risk free rate

Benchmarking to risk-free rate (UK or US yields)

	Bonds	Mean	Median	SD	Min	Max
Nominal returns (1820-2012)						
Realized return (ex-post, in %)	680	0.9	3.6	13.0	-95	27
Promised return (ex-ante in %)	680	6.8	6.5	3.1	1	30
Premium over risk-free rate (1820-2012)						
Realized return (in %) - risk free rate (US/UK	680	-3.0	-0.1	13.2	-100	24
Promised return (in %) - risk free rate (US/UK	680	3.1	3.1	3.2	-5	24

Risk free rates:
- Until 1920: UK long-term bonds (consols)
- After 1920: US long-term treasuries

Counterfactual: <u>non-defaulted</u> bonds (1850-1914)

Realized returns of defaulted vs. non-defaulted bonds
Subsample: 1850-1914

Legend: ■ defaulted bonds   ■ non-defaulted bonds (all)

<u>Country sample for non-defaulted bonds</u>: Argentina, Bolivia, Brazil, Bulgaria, Chile, Colombia, Denmark, Egypt, Finland, Greece, Hungary, Italy, Japan, Mexico, Morocco, Netherlands, Norway, Peru, Portugal, Romania, Russia, Spain, Sweden, Thailand, Turkey, Venezuela.

Counterfactual: <u>non-defaulted</u> bonds 1850-1914

Realized returns of defaulted vs. non-defaulted bonds
Subsample: 1850-1914

	Bonds	Mean	Median	SD	Min	Max
Defaulted bonds	286	1.9	3.1	11	-93.5	27
Non-defaulted bonds						
Total Sample	292	6.2	5.7	2.1	3.1	18.3
Countries with default history	231	6.6	6	2	3.7	18.3
Countries without default history	61	4.7	4.3	1.5	3.1	12.1

<u>Country sample for non-defaulted bonds</u>: Argentina, Bolivia, Brazil, Bulgaria, Chile, Colombia, Denmark, Egypt, Finland, Greece, Hungary, Italy, Japan, Mexico, Morocco, Netherlands, Norway, Peru, Portugal, Romania, Russia, Spain, Sweden, Thailand, Turkey, Venezuela.

Adjusting for inflation

CPI deflated (BoE data)

	Bonds	Mean	Median	SD	Min	Max
Nominal and real returns (1820-1914)						
Defaulted bonds						
Promised nominal return (ex-ante in %)	130	7.3	6.6	2.9	2.6	15.5
Realized **nominal** return (ex-post, in %)	130	1.8	3.1	10.0	-62.7	16.5
Realized **real** return (ex-post, in %)	130	0.3	1.3	9.6	-59.9	16.8
Non-defaulted bonds						
Realized nominal return (ex-post, in %)	206	6.6	5.8	2.3	2.9	14.6
Realized real return (ex-post, in %)	206	5.2	5.1	3.3	-9.3	13.7

All returns in GBP, source inflation: Bank of England (2014) "Three centuries of macroeconomic data"
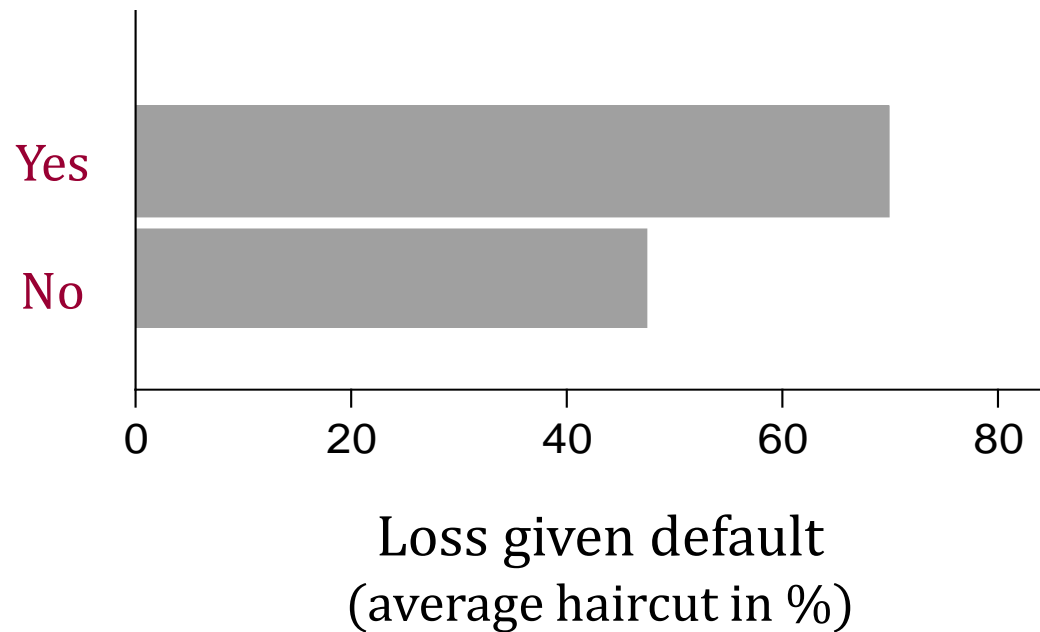
Stylized Fact 7:

Credit booms predict (high) haircuts and (low) returns

Indicative evidence for „This-Time-is-Different Syndrome“ (Reinhart Rogoff 2009, Gennaioli, Shleifer, and Vishny 2015, Baron and Xiong 2014, for stocks)

Credit boom today, higher <u>haircuts</u> tomorrow

Credit booms in financial center (GB, USA) using
data by Schularick and Taylor (2010, AER)

Credit boom in
year of issuance?

Loss given default
(average haircut in %)

Haircuts, bond-level (1815-2013)

Dependent Variable: Bond-by-bond haircuts

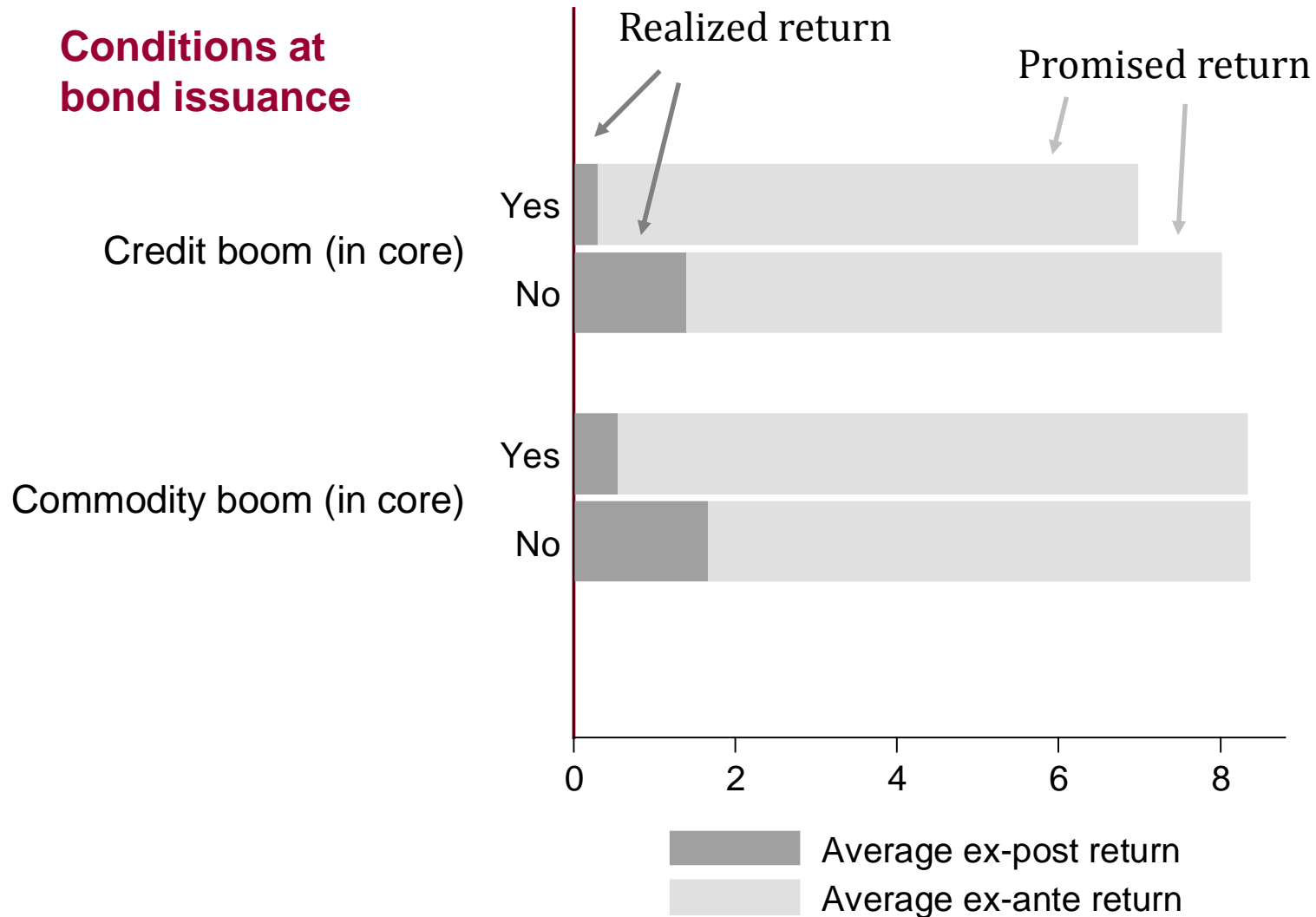|	(1) OLS	(2) OLS	(3) OLS	(4) Country FE	(5) Country FE	(6) Country FE	(7) Country FE	(8) Country FE
Ex-ante returns	-0.54			1.32***				
	(0.87)			(0.35)				
Maturity (at issuance)		-0.06	0.06		-0.13***	-0.05	-0.02	-0.11**
		(0.16)	(0.17)		(0.05)	(0.05)	(0.05)	(0.05)
Bond size (amount in real US$, log)		1.22	0.82		-0.65	-0.92*	-0.87*	-0.53
		(1.25)	(1.29)		(0.49)	(0.49)	(0.51)	(0.49)
Issue price (% of face)		0.12	0.27		-0.32***	-0.11	-0.11	-0.34***
		(0.20)	(0.33)		(0.12)	(0.14)	(0.14)	(0.12)
Coupon rate (at issuance)		-1.14	-0.89		1.75***	0.90*	1.51***	1.62***
		(1.21)	(1.29)		(0.51)	(0.53)	(0.53)	(0.51)
Total debt to GDP (in %, at issuance)			0.11*		0.00	0.04	0.01	-0.00
			(0.06)		(0.03)	(0.03)	(0.03)	(0.03)
Credit growth in the core (5 year moving average, Schularick/Taylor)						46.86**		
						(21.49)		
Credit Boom in the core (dummy, Schularick/Taylor)							7.29***	
							(2.63)	
Commodity price boom in the core (dummy, Reinhart/Rogoff)								5.77**
								(2.27)
Constant	57.35***	40.87*	13.34	2.21	54.97**	38.70*	35.40	57.44**
	(7.93)	(23.03)	(28.77)	(8.72)	(22.43)	(23.01)	(23.44)	(22.34)
Observations	680	754	593	680	593	569	546	593
R-squared	0.003	0.011	0.044	0.623	0.691	0.704	0.699	0.695

Bond characteristics alone have little predictive value (without country FE)

Booms predict haircut size

Standard errors clustered on restructurings in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Credit booms today, lower <u>returns</u> tomorrow

Conclusion

- Many parallels over the past two centuries (patterns of haircuts, returns, crisis resolution)

- Despite high haircuts, creditors do not fare too badly
  – Average ex-post-returns on defaulted bonds >0
  – Full repudiation very rare, settlement is the norm

- Warning signs for investors?
  – Level and increase in debt/GDP
  – Lending boom / strong credit growth at issuance
  – Avoid communist revolutions!

Next steps...

Investor returns:

- Compute total returns from secondary market prices over the long run (1860-2015)
- Are returns higher in case of official bailouts and other official interventions? (gunboats / diplomatic pressure)
- Compare returns to domestic bonds and other asset classes

Debt relief:

- Compare debt relief by official and private creditors
- Solving debt crises: lessons from history (how can serial restructurings and lengthy defaults be avoided?)