Monetary Policy, Inflation, and Crises: Evidence from History and Administrative Data

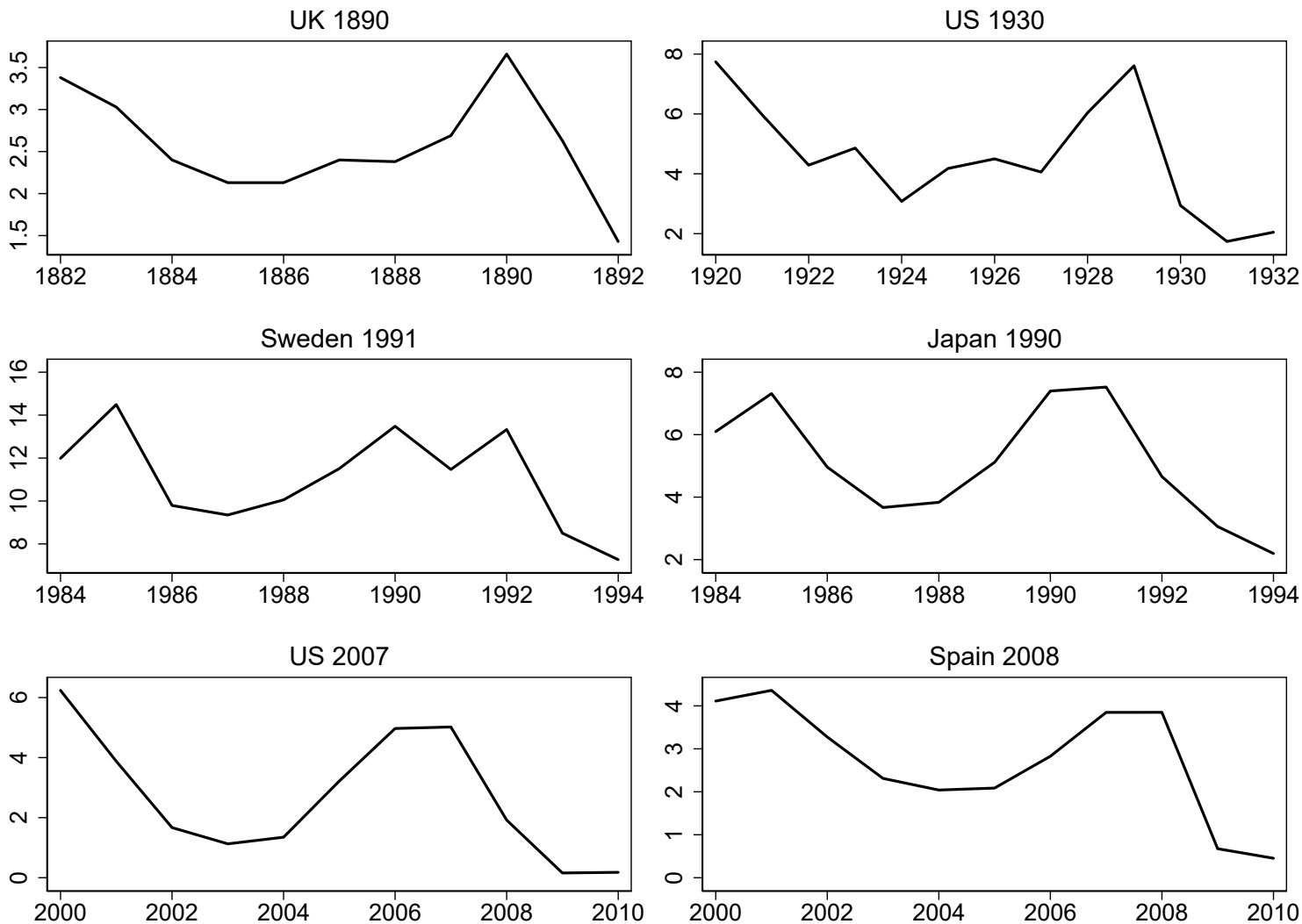
Gabriel Jiménez, Dmitry Kuvshinov, José-Luis Peydró, Björn Richter

Banco de España, Imperial College, UPF & BSE

Motivation

- Current environment: high inflation, rising policy rates
- Policymakers are balancing risks of inflation vs recession
  - We know a lot about these inflation–GDP trade-offs (Blinder, 2023)
- But raising rates can also trigger a financial crisis (2022-23 financial distress: SVB & other banks, sovereign EA, UK pension funds / Gilts, stablecoin, CRE, ...)
  - Especially after a period of low rates (Acharya et al., 2022; Kashyap and Stein, 2023; IMF, 2023; ECB, 2023; Rajan, 2023)
- We **know little about the links between the path of monetary policy and banking crises**

Case studies of important banking crises



y axis: nominal monetary policy rate

This paper

- **Impact of monetary policy (MP) dynamics on banking crises**
  - What is the full path of the MP rate before a crisis?
  - Does raising rates in an environment like today (U-shaped path) increase crisis risk?
  - What are the underlying mechanisms?
- **Data: two-pronged approach**
  - A panel of historical crises to establish the results & mechanisms (17 countries, 1870–2016, 80 crises)
  - Credit registry data for detailed crisis case study (Spain, 1995–2020)
- MP rate: short-term nominal rate (raw or relative to GDP and inflation dynamics); international finance trilemma IV

Findings

1. Banking crises preceded by a U in monetary policy (MP) rates
   - MP-U materially increases banking crisis risk
     - Larger effects for stronger U (over systematic part)
   - Different for non-crisis recessions

Findings

1. **Banking crises preceded by a U in monetary policy (MP) rates**
   - **MP-U materially increases banking crisis risk**
     - Larger effects for stronger U (over systematic part)
   - **Different for non-crisis recessions**

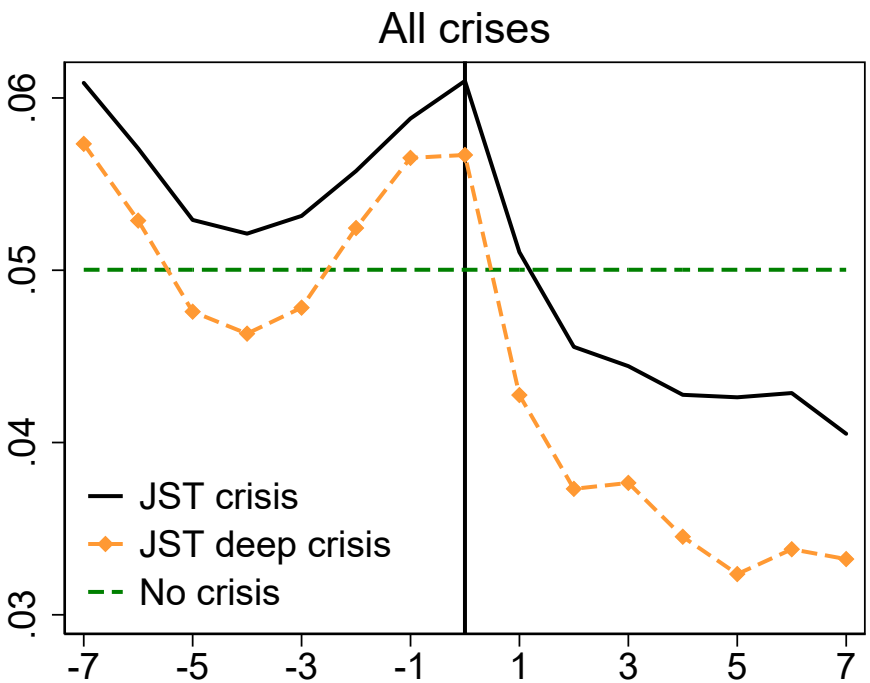
2. **Mechanism**: higher credit & asset prices as MP rates are cut (first half of the U), stronger reversal if raises follow such cut
   - Red-zone booms (Greenwood et al., 2022) especially after (large) MP rate cuts (consistent with credit supply)
   - Higher crisis risk after MP raises in the R-zone, but only for R-zones preceded by cuts. **Both MP U and R-zone crucial**
   - Boom-bust in **bank performance** around U-MP & R-zones
   - **Microdata**: loan defaults higher after U-MP, especially for ex-ante riskier firms & banks

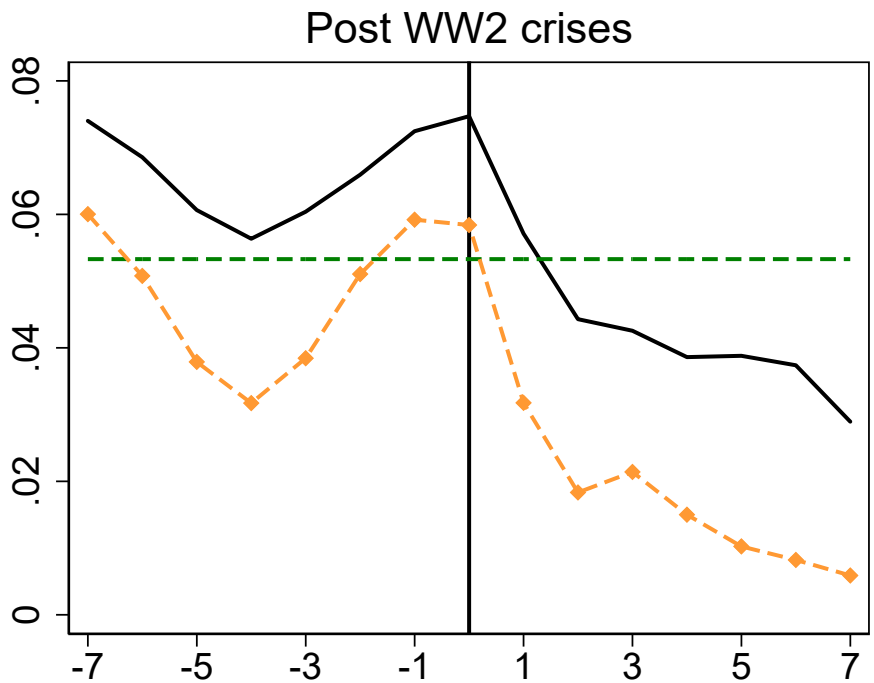
The path of monetary policy rates and crisis risk

Data

- 17 advanced economies (13 European countries, USA, Canada, Australia, Japan), 1870–2016 (Jordà et al., 2016)
- Narrative crisis definition (Schularick and Taylor, 2012) (bank runs / defaults / forced mergers)
  - Robust to Baron et al. (2021) chronology: narrative + sharp declines in bank stock returns
- Monetary policy rate: short-term interest rate (central bank / interbank / t-bill rate)

Monetary policy rates around crises



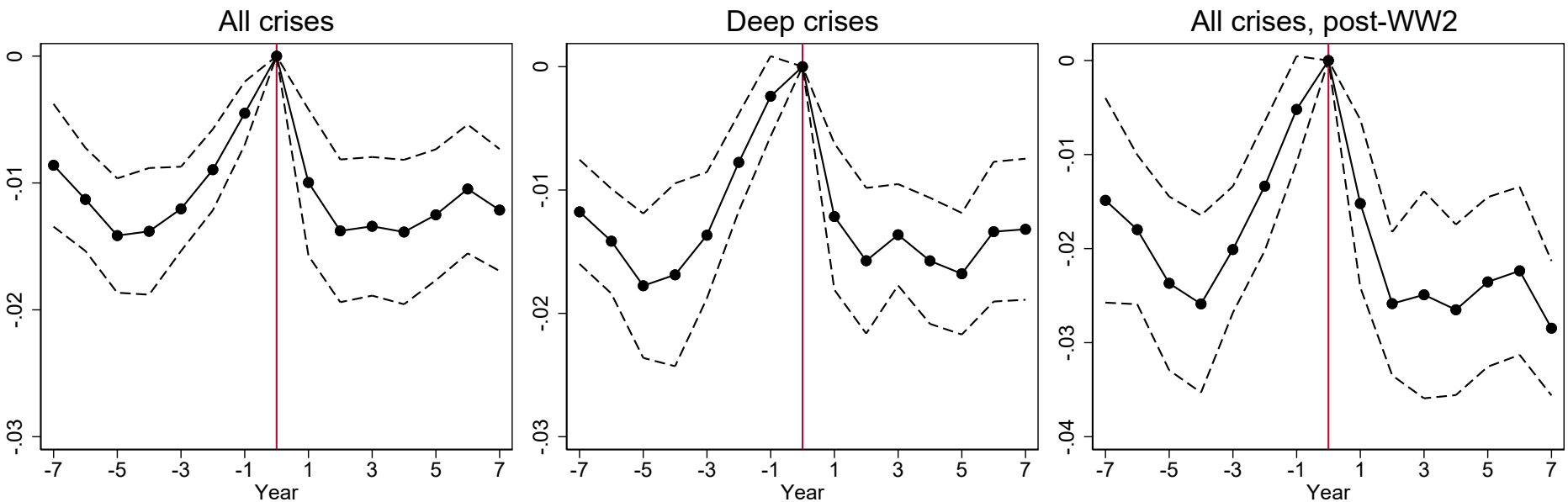


Crisis definitions. JST: Jordà et al. (2016); JST deep: JST & low GDP growth

▸ Inflation & real rates

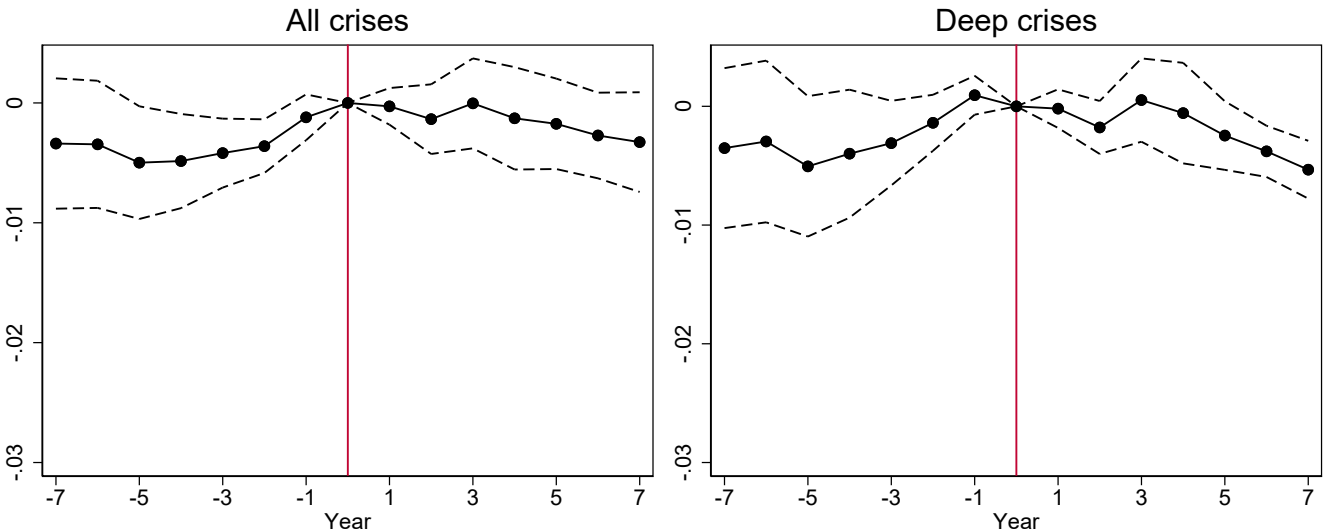
Crisis window regressions: monetary policy rates

$$r_{i,t+h} - r_{i,t} = \alpha_{i,h} + \alpha_{d,h} + \beta_h \mathbb{1}_{Crisis_{i,t}=1} + \epsilon_{i,t+h} \quad h \in \{-7, ..., 7\}.$$

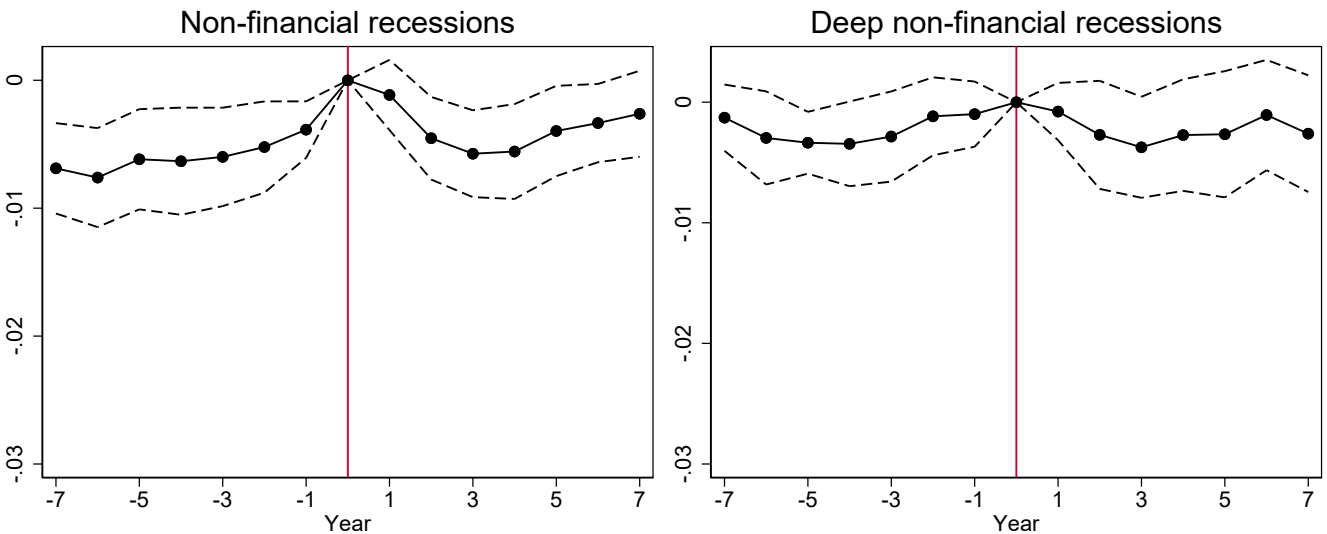


Window regressions: recessions & long-term rates

(a) Long-term rate around crises:



(b) Monetary policy rate around recessions:



Recession graphs: business cycle peak at t = 0.

Frequency of MP paths before crises & recessions

- Sort data in 2×2 groups by time window (t − 8 to t − 3 & t − 3 to t) and monetary rate change (cut vs raise)
- 55% of crises are preceded by a U in full sample; 71% post WW2
- By contrast, only $\approx$ 30% of recessions preceded by U ▸ Graphs

	(1) All	(2) Deep	(3) Post-WW2	(4) Post-WW2 deep	(5) Unconditional
			Panel A: Banking crises		
U shape (cut, raise)	0.55***	0.63***	0.71***	1.00***	0.27
Raise, raise	0.19	0.16	0.12	0.00	0.24
Raise, cut	0.16	0.11	0.08	0.00	0.26
Cut, cut	0.10	0.11	0.08	0.00	0.23
			Panel B: Non-financial recessions		
U shape (cut, raise)	0.34**	0.30	0.31	0.31	0.27
Raise, raise	0.21	0.21	0.29	0.46**	0.24
Raise, cut	0.25	0.21	0.26	0.15	0.26
Cut, cut	0.20	0.28*	0.14	0.08	0.23

*: higher frequency than non-crisis obs

Frequency of crises after different MP rate paths

- Sort data in 2×2 groups by time window ($t-8$ to $t-3$ & $t-3$ to t) and monetary rate change (cut vs raise)
- Compute crisis during 3 years after each shape (t to $t+2$)
- Crises are more than twice as frequent after the U shape

	(1)	(2)	(3)	(4)
	Crisis	Deep crisis	Post-WW2 crisis	Post-WW2 deep crisis
U shape (cut, raise)	0.18***	0.11***	0.16***	0.13***
Raise, raise	0.09	0.04	0.04	0.01
Raise, cut	0.06	0.02	0.02	0.00
Cut, cut	0.06	0.03	0.03	0.00
Unconditional	0.10	0.05	0.06	0.03

▸ With numbers of crises ▸ 1-year crisis window ▸ Symmetric U

Trilemma instrument

- Countries with fixed exchange rate and open capital accounts are forced to track base country interest rates (Mundell, 1963)
- Use base country interest rate changes to look at exogenous policy responses (Jordà et al., 2020, see also Maddaloni and Peydro, 2011; Jiménez et al., 2012, 2014)

$$\text{Trilemma IV} = \Delta \text{Rate}^{\text{Residual}}_{b(i),t} * \text{PEG}_{i,t} * \text{PEG}_{i,t-1} * \text{KOPEN}_{i,t}.$$

- $\text{Rate}^{\text{Residual}}_{b(i),t}$: change in the base country residual rate
  - Controls: inflation, GDP, consumption, investment, current account, short-term rates, long-term rates

U-shaped monetary policy rates and crises

$$\text{Crisis}_{i,t \text{ to } t+2} = \alpha_i + \beta_1 \Delta_3 \text{Rate}_{i,t} + \beta_2 \text{Cut}_{i,t-8,t-3} + \beta_3 \Delta_3 \text{Rate}_{i,t} \times \text{Cut}_{i,t-8,t-3} + \gamma X_{i,t} + u_{i,t}.$$

	Dependent variable: $\text{Crisis}_{t \text{ to } t+2}$							
	Full sample				Post-WW2			
	OLS		IV		OLS		IV	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta_3 \text{Rate}_t$	0.02**	0.01	0.03	0.01	0.01	0.01	0.03	0.01
	(0.01)	(0.00)	(0.02)	(0.01)	(0.01)	(0.01)	(0.03)	(0.02)
$\text{Cut Rate}_{t-8,t-3}$		0.05		0.04		0.04		0.01
		(0.03)		(0.03)		(0.03)		(0.03)
$\Delta_3 \text{Rate}_t \times \text{Cut Rate}_{t-8,t-3}$		0.03**		0.07**		0.02**		0.08***
		(0.01)		(0.03)		(0.01)		(0.03)
Country fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓	✓	✓
Kleibergen-Paap Weak ID			45.41	26.57			54.27	24.34
Observations	1626	1626	1626	1626	951	951	951	951

$X_{i,t}$ contains 8 lags of yearly real GDP growth and inflation (country and sample average), and a crisis dummy.
Driscoll-Kraay s.e. with 5 lags.

▸ Economic effects ▸ Excluding GFC ▸ BVX crises ▸ Probit

No U-shape effects for (deep) non-crisis recessions

	Normal recession$_{t \text{ to } t+2}$				Deep recession$_{t \text{ to } t+2}$	
	OLS		IV		OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Δ_3 Rate$_t$	0.02**	0.02**	0.05*	0.06*	0.01**	0.03
	(0.01)	(0.01)	(0.03)	(0.03)	(0.00)	(0.02)
Cut Rate$_{t-8,t-3}$		-0.05		-0.08**	-0.03	-0.05
		(0.03)		(0.04)	(0.02)	(0.03)
Δ_3 Rate$_t$ × Cut Rate$_{t-8,t-3}$		0.01		-0.00	-0.00	-0.01
		(0.01)		(0.04)	(0.01)	(0.02)
Country fixed effects	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓
Kleibergen-Paap Weak ID			48.80	29.22		29.22
Observations	1626	1626	1626	1626	1626	1626

$X_{i,t}$ contains 8 lags of yearly real GDP growth and inflation (country and sample average), and recession dummy. Driscoll-Kraay s.e. with 5 lags.

Does the depth of the U matter?

- Analyse MP relative to macroeconomic developments: systematic MP proxied by GDP and inflation – by country and period (pre-1914, interwar, Bretton-Woods, post-1973)
- **Cutting and raising more than systematic component** is linked to higher crisis risk, in freq. tables & regressions

▸ Detailed ▸ Regression cuts ▸ Regression raises ▸ 3 × 3 ▸ 3 × 3, residuals

	(1)	(2)	(3)	(4)
	Crisis	Deep crisis	Post-WW2 crisis	Post-WW2 deep crisis
Strong U (residual cut & raise)	0.28***	0.19***	0.25***	0.20***
Moderate U (systematic cut or raise)	0.12	0.08	0.10	0.07
Raise, raise	0.08	0.03	0.05	0.01
Raise, cut	0.03	0.02	0.02	0.00
Cut, cut	0.06	0.04	0.03	0.00
Unconditional	0.10	0.06	0.07	0.04

Understanding the mechanisms

Why does U-shaped policy increase crisis risk?

- Low rates create financial vulnerabilities (Jiménez et al., 2014; Acharya and Rajan, 2022; Kashyap and Stein, 2000)
- Rate increases may crystallize these vulnerabilities
- Define financial "red zone" (R-zone) as in Greenwood, Hanson, Shleifer, and Sørensen (2022)
- Red zone (R-zone) = joint credit & asset price boom:

$$\text{R-zone}_{i,j,t} = \text{High-Credit-Growth}_{i,j,t} * \text{High-Price-Growth}_{i,j,t}$$

$$\text{High-Cred.-Growth}_{i,j,t} = 1\left\{\Delta_3(\text{Credit/GDP})_{i,j,t} > 80^{\text{th}} \text{ percentile}\right\}$$

$$\text{High-Price-Growth}_{i,j,t} = 1\left\{\Delta_3 \ln(\text{Asset Price})_{i,j,t} > 66.7^{\text{th}} \text{ percentile}\right\}$$

Rate cuts increase the likelihood of future R-zones

- Monetary rate cuts increase the likelihood of ending up in the R-zone over the next 3 years ▸ Res. rates

	R-Zone Either$_{t+1 \text{ to } t+3}$					
	ΔRate$_{t-5,t}$		Cut Rate$_{t-5,t}$		Large Cut$_{t-5,t}$	
	OLS (1)	IV (2)	OLS (3)	IV (4)	OLS (5)	IV (6)
See header	-0.02***	-0.05***	0.07**	0.34**	0.09***	0.35***
	(0.01)	(0.02)	(0.04)	(0.15)	(0.03)	(0.13)
Country fixed effects	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓
Kleibergen-Paap		43.48		54.67		26.98
Observations	1335	1335	1335	1335	1335	1335

- Also, in the boom: low credit spreads; high bank equity valuations; predictably worse future outcomes ▸ Details
  - Consistent with ↑ credit supply & overoptimism

Raising rates in the R-zone triggers crises

- (Strong) raises in the R-zone increase crisis risk

	Dependent variable: $\text{Crisis}_{t \text{ to } t+2}$					
	All raises			Residual raises		Systematic raises
	OLS (1)	OLS (2)	IV (3)	OLS (4)	IV (5)	OLS (6)
$\text{R-Zone}_{t-3 \text{ to } t-1}$	0.13***	0.04	-0.05	0.06**	-0.02	0.10***
	(0.03)	(0.02)	(0.07)	(0.02)	(0.06)	(0.03)
$I(\Delta_3 \text{Rate}_t \geq 0)$		0.05*	-0.01	0.05	-0.04	0.03
		(0.03)	(0.10)	(0.03)	(0.11)	(0.02)
$\text{R-Zone} \times I(\Delta_3 \text{Rate} \geq 0)$		0.18***	0.36**	0.19***	0.42***	0.10**
		(0.05)	(0.15)	(0.06)	(0.16)	(0.05)
Country fixed effects	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓
Kleibergen-Paap Weak ID			14.52		11.24	
Observations	1351	1351	1351	1351	1351	1351

- But only if rates were cut before entering R-zone ▸ Pre-cut RZ

Combination of U-MP & R-zone is crucial for banking crises

	(1)	(2)	(3)	(4)
	Crisis	Deep crisis	Post-WW2 crisis	Post-WW2 deep crisis
U-shaped MP & R-zone	0.36*** (18/49)	0.25*** (12/49)	0.37*** (12/33)	0.30*** (10/33)
U-shaped MP & no R-zone	0.10 (11/118)	0.07 (8/118)	0.06 (3/58)	0.04 (2/58)
No U-shaped MP & R-zone	0.11 (10/98)	0.05 (5/98)	0.06 (4/71)	0.01 (1/71)
No U-shaped MP & no R-zone	0.05 (19/364)	0.03 (10/364)	0.02 (4/220)	0.00 (0/220)
Unconditional	0.09 (58/628)	0.06 (36/628)	0.06 (24/382)	0.03 (13/382)

* if frequency $>$ other bins

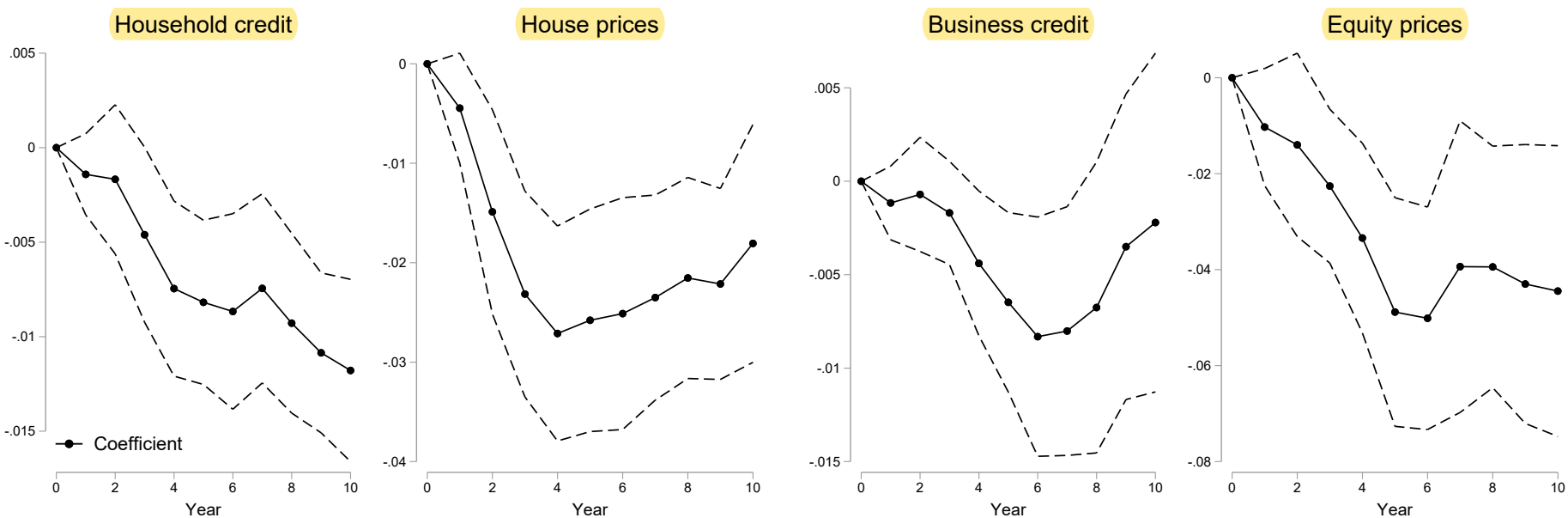
▸ Residual U & R-zones ▸ Broader R-zone window

Why is the combination of U & R-zone conducive to crises?

- Raising rates in the R-zone reverses the vulnerabilities that built up during the low-rate period
  - Test: when rates are raised, is the reversal in vulnerabilities (e.g., house prices, credit) larger, the more elevated the vulnerability?
- Raising rates after long periods of cuts puts stress on the banking system
  - Test: what is the impact of U-shaped policy rates on banking sector returns, NPLs & profits?

Reversal in pre-existing vulnerabilities

$$\Delta_h y_{i,t+h} = \alpha_{i,h} + \alpha_{d,h} + \beta_{1,h}\Delta \text{Rate}_{i,t} + \beta_{2,h} I(\Delta_3 y_{i,t} \geq \text{Rz}) +$$
$$\beta_{3,h}\Delta \text{Rate}_{i,t} \times I(\Delta_3 y_{i,t} \geq \text{Rz}) + \sum_{L=0}^{L=5} \gamma_L X_{i,t-L} + \epsilon_{i,t+h}$$



- Raising rates when, e.g., house prices are elevated, results in larger future drops in house prices ▸ IV

U-shaped monetary policy and banks

- Banking sector key to MP transmission & crises
- Below: U-shape in MP rates leads to declines in bank profitability, increasing loan losses, lower bank stock returns and higher risk of bank equity crashes

	$\Delta \text{RoE}_{t \text{ to } t+2}$		$\Delta \text{NPL}_{t \text{ to } t+2}$		$\text{Return}^{\text{Bank}}_{t \text{ to } t+2}$		$\text{Crash}^{\text{Bankeq.}}_{t \text{ to } t+2}$	
	OLS (1)	IV (2)	OLS (3)	IV (4)	OLS (5)	IV (6)	OLS (7)	IV (8)
$\Delta_3 \text{Rate}_t$	-0.12	-0.01	0.05**	0.13***	-0.02	0.02	0.00	-0.00
	(0.15)	(0.33)	(0.02)	(0.04)	(0.01)	(0.02)	(0.00)	(0.01)
$\text{Cut Rate}_{t-8,t-3}$	0.17	0.43	0.03	-0.04	-0.04	-0.06	0.05**	0.03
	(0.70)	(0.65)	(0.09)	(0.07)	(0.05)	(0.05)	(0.03)	(0.03)
$\Delta_3 \text{Rate}_t \times \text{Cut Rate}_{t-8,t-3}$	-0.83***	-3.16***	0.09***	0.27***	-0.03*	-0.07*	0.03**	0.07**
	(0.26)	(1.04)	(0.03)	(0.09)	(0.02)	(0.04)	(0.01)	(0.03)
Country fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓	✓	✓
Kleibergen-Paap Weak ID		30.49		16.51		17.91		27.01
Observations	1563	1350	868	756	1420	1298	1903	1626

Summary of the main results

- **U-shaped MP rate path materially increases crisis risk**
  - Raising MP rates increases crisis risk, but only if rates were previously cut over a long period
  - **Unique to banking crises. Different for recessions**
  - Stronger for deeper U
- Mechanism: financial boom as MP rates are cut; stronger reversal as rates are raised
  - Red-zone booms especially after (large) MP rate cuts
    - Consistent with credit supply
  - Higher crisis risk after MP raises in the R-zone, but only for R-zones preceded by cuts. **Both MP U and R-zone crucial**
  - Boom-bust & U-MP effects for bank returns, NPLs & profits
  - Microdata: defaults ↑ after U, esp. for worse firms & banks

Contribution to the literature

1. Monetary policy & financial stability
   - Low rates $\rightarrow$ higher asset prices/credit/risk taking (Rajan, 2006; Adrian and Shin, 2010; Maddaloni and Peydro, 2011; Jiménez et al., 2014; Becker and Ivashina, 2015; Acharya et al., 2020; Grimm et al., 2023)
   - Rate hikes $\rightarrow$ crises (Schularick et al., 2021)
   - Recent theoretical work on combination of loose policy & subsequent tightening as trigger (Boissay et al., 2021; Acharya et al., 2022; Akinci et al., 2023; Goldberg and López-Salido, 2023)
   - **We show the full MP path matters:** (strong) cuts followed by raises generate financial instability

2. Credit, asset prices & financial stability
   - Credit and asset price booms $\rightarrow$ financial crises (Schularick and Taylor, 2012; Mian et al., 2017; Greenwood et al., 2022)
   - **We show that MP is necessary for crises:** key in build-up and reversal of booms, and in R-zones ending up in crises

Bigger picture policy implications

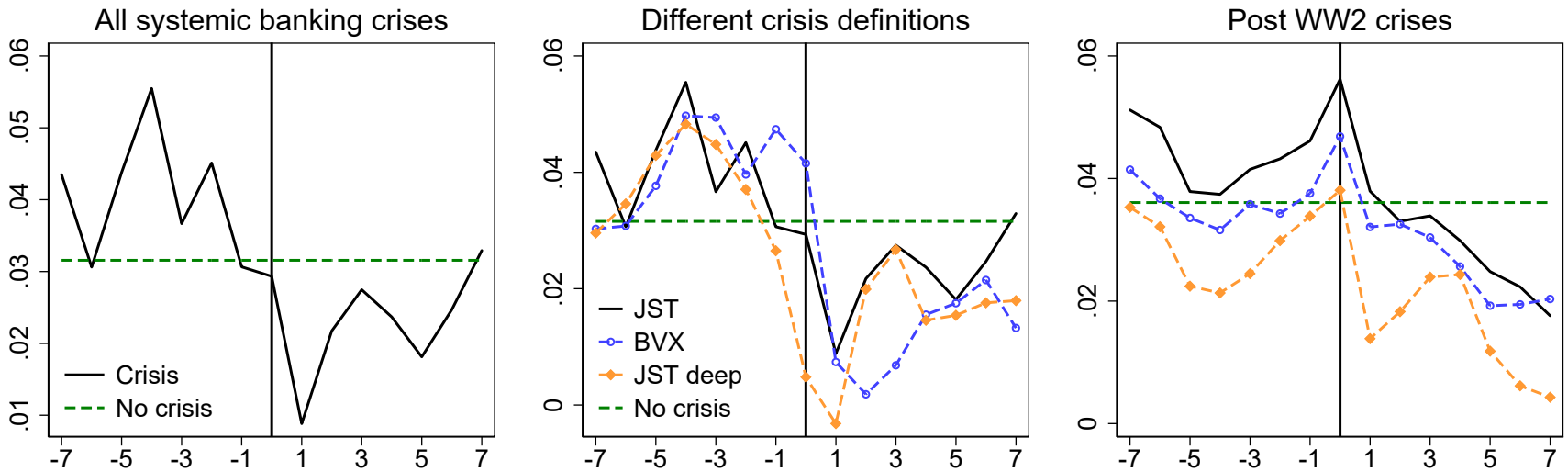
- Effects of monetary policy on crises are path-dependent
- To prevent financial booms from turning into crises, better for MP (or/and macropru) to act before the red zone
  - Deviations from Taylor rule of GDP & inflation; LTV caps / countercyclical buffers
- Avoid very strong MP raises in the red zone, especially if rates were cut and low for a long time before
- If in red zone & need higher MP rates, macropru & supervision crucial
  - Credit risk crucial, and not only interest rate risk
- Consistent with recent theoretical models of Boissay et al. (2021) and Goldberg and López-Salido (2023)

Appendix

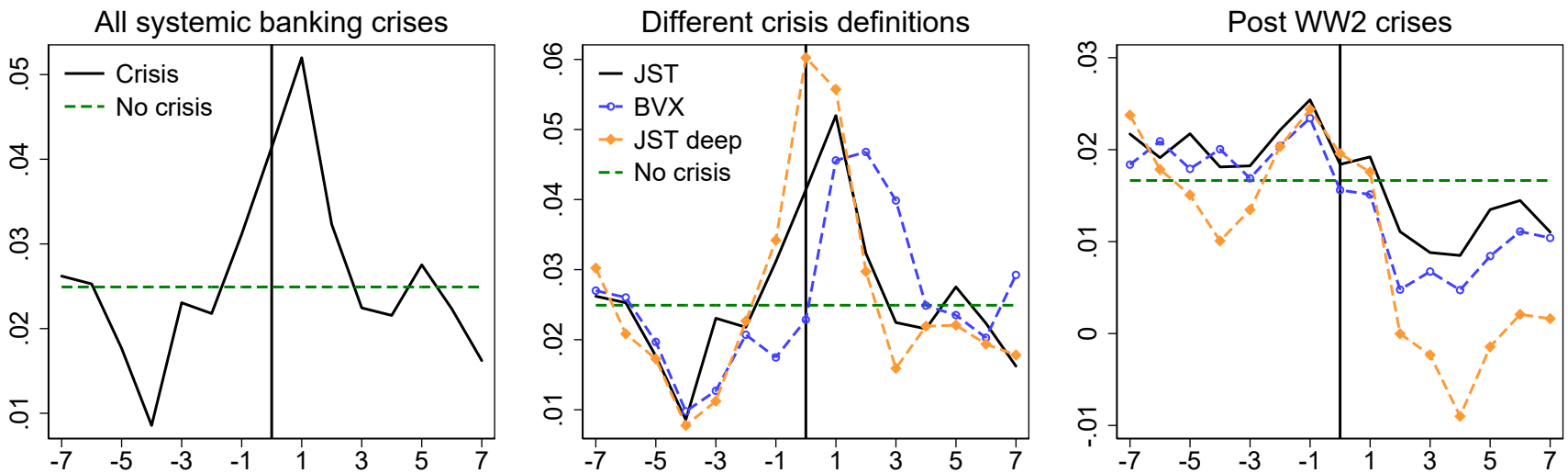
Inflation and real interest rates around crises

back

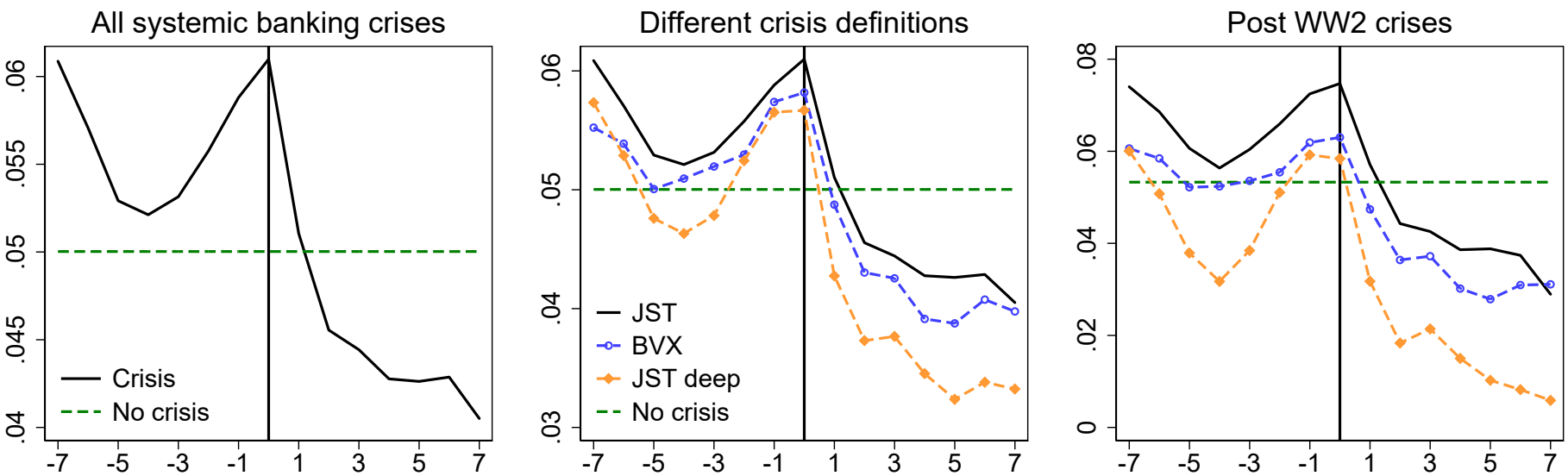
(a) Inflation:



(b) Real interest rates:



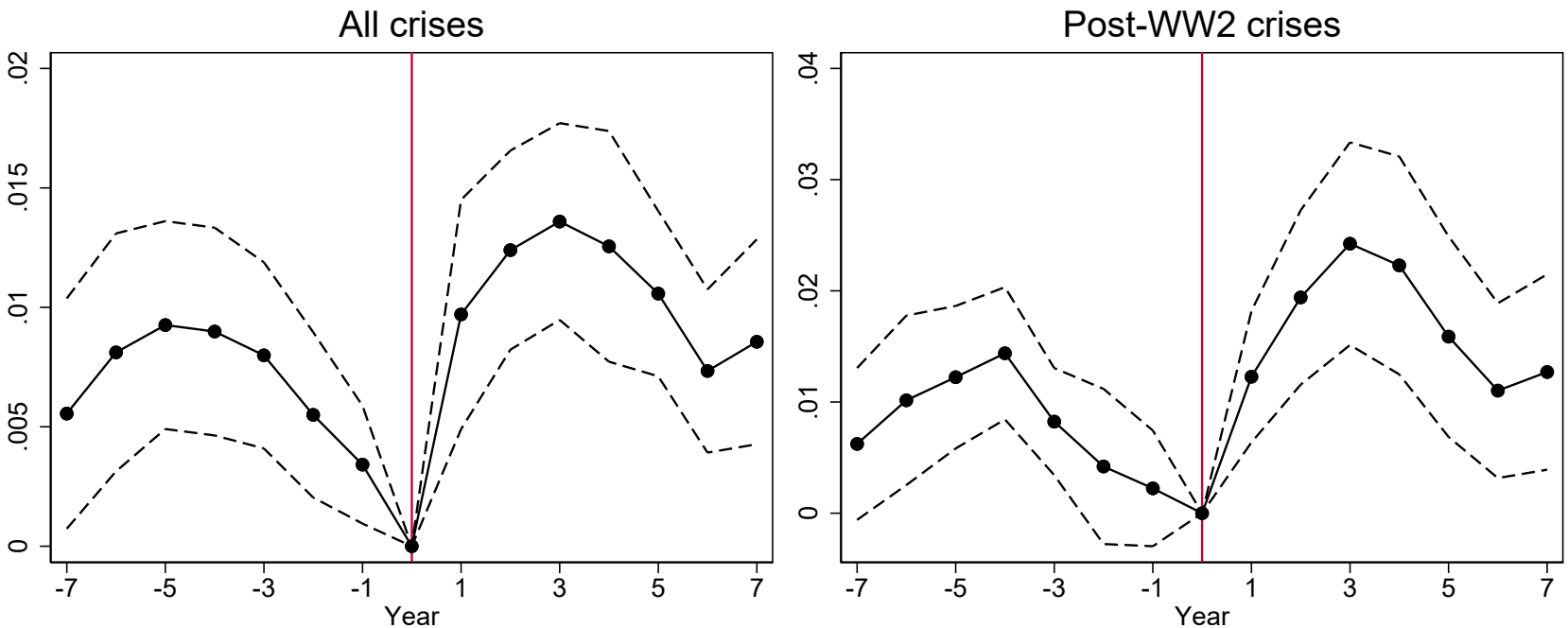
Monetary policy rates around crises



Crisis definitions. JST: Jordà et al. (2016), BVX: Baron et al. (2021), JST deep: JST & low GDP growth

Back

Crisis window regressions: term premia (long – short rate)

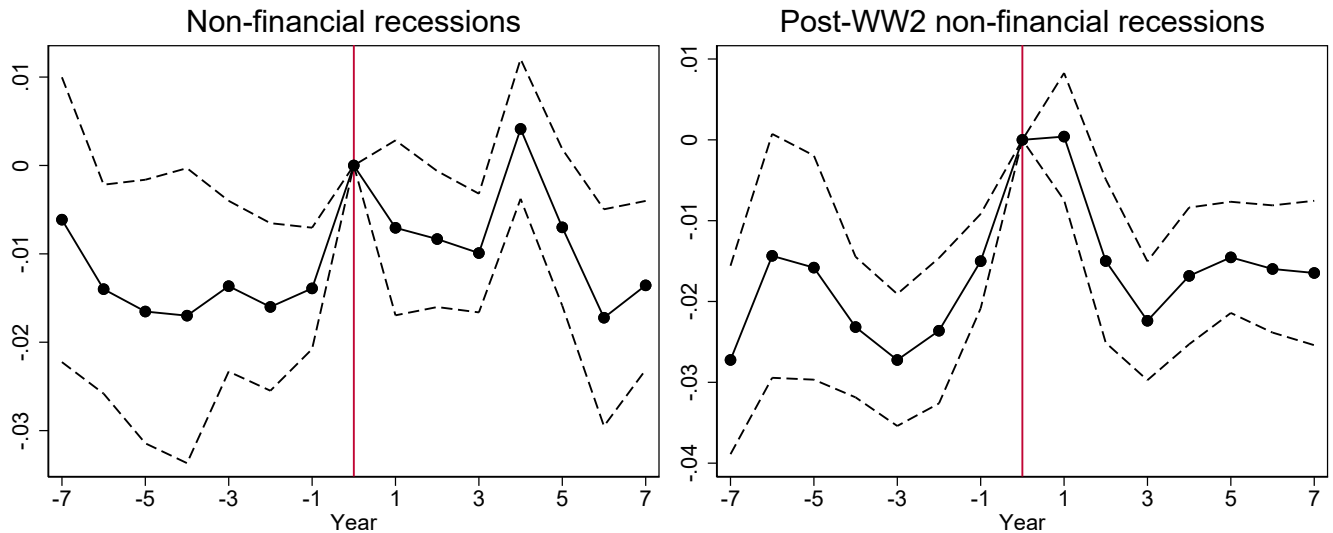


Back

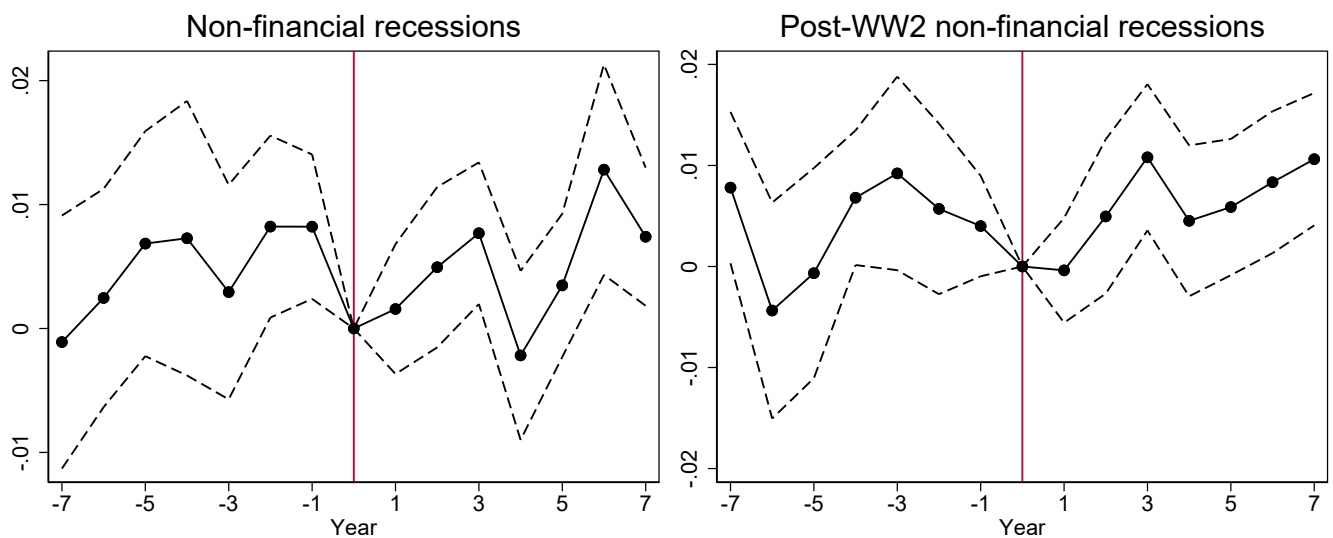
Recession window regressions: real rates & inflation

back

(a) Inflation:



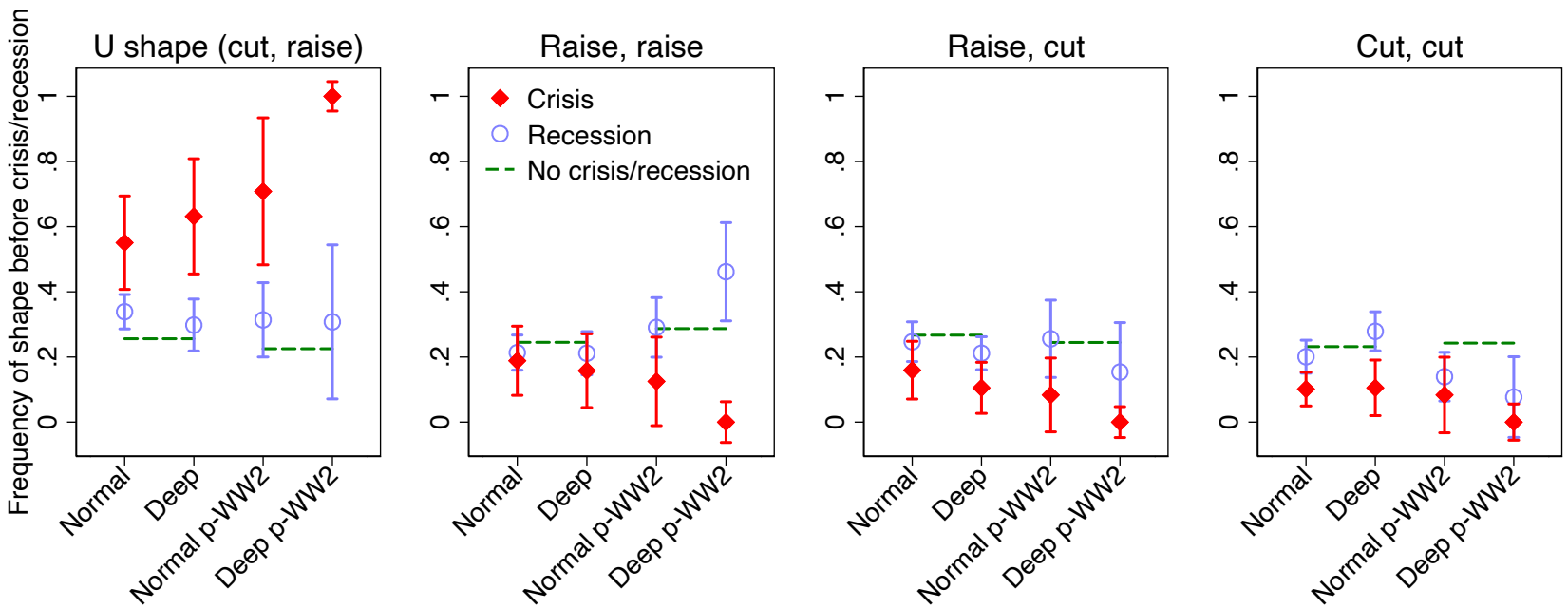
(b) Real interest rate:



Frequency of MP-rate paths before crises and recessions

back

- What is the frequency of the four different policy shapes before crises relative to sample average (and relative to recessions)?
- Red diamonds correspond to previous table / blue circles show frequency of shapes for non-financial recessions



Frequency of crises – with numbers of crises

	(1)	(2)	(3)	(4)
	Crisis	Deep crisis	Post-WW2 crisis	Post-WW2 deep crisis
U shape (cut, raise)	0.18 (35/196)	0.11 (22/196)	0.16 (15/93)	0.13 (12/93)
Raise, raise	0.09 (15/170)	0.04 (7/170)	0.04 (4/109)	0.01 (1/109)
Raise, cut	0.06 (10/186)	0.02 (4/186)	0.02 (2/93)	0.00 (0/93)
Cut, cut	0.06 (9/164)	0.03 (5/164)	0.03 (2/93)	0.00 (0/93)
Unconditional	0.10 (70/715)	0.05 (39/715)	0.06 (24/388)	0.03 (13/388)

back

Frequency of crises by policy rate path: 1 year ahead crises

	(1)	(2)	(3)	(4)
	Crisis	Deep crisis	Post-WW2 crisis	Post-WW2 deep crisis
U shape (cut, raise)	0.06***	0.04**	0.06*	0.05**
Raise, raise	0.03	0.01	0.01	0.00
Raise, cut	0.02	0.01	0.01	0.00
Cut, cut	0.01	0.01	0.01	0.00
Unconditional	0.03	0.02	0.02	0.01

Back

Frequency of crises by policy rate path: symmetric U window (t − 6 to t − 3 and t − 3 to t)

	(1)	(2)	(3)	(4)
	Crisis	Deep crisis	Post-WW2 crisis	Post-WW2 deep crisis
U shape (cut, raise)	0.19***	0.11***	0.16***	0.12***
Raise, raise	0.09	0.05	0.03	0.01
Raise, cut	0.06	0.03	0.02	0.00
Cut, cut	0.06	0.03	0.03	0.00
Unconditional	0.10	0.06	0.06	0.03

Back

Paths of inflation and real rates do not predict crises

back

	Dependent variable: $\text{Crisis}_{t \text{ to } t+2}$					
	Real rates			Inflation		
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta_3 \text{Var}_t$	0.002	0.002	0.001	0.000	0.001	-0.000
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
$1(\Delta \text{Var}_{t-8,t-3} < 0)$		0.009	0.009		-0.006	-0.006
		(0.024)	(0.024)		(0.024)	(0.024)
$\Delta_3 \text{Var}_t \times 1(\Delta \text{Var}_{t-8,t-3} < 0)$			0.002			0.002
			(0.003)			(0.002)
Country fixed effects	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓
Observations	1624	1622	1622	1622	1622	1622

U-shaped policy and crises: 1-year changes

back

$$\text{Crisis}_{i,t \text{ to } t+2} = \alpha_i + \beta_1 \Delta\text{Rate}_{i,t} + \beta_2 \text{Cut}_{i,t-8,t-3} + \beta_3 \Delta\text{Rate}_{i,t} \times \text{Cut}_{i,t-8,t-3} + \gamma X_{i,t} + u_{i,t \text{ to } t+2}.$$

	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
ΔRate_t	0.02***	0.02***	0.01	0.01	0.02	-0.01
	(0.00)	(0.00)	(0.00)	(0.02)	(0.02)	(0.01)
$\text{Cut Rate}_{t-8,t-3}$		0.08***	0.08***		0.08***	0.08***
		(0.02)	(0.02)		(0.02)	(0.02)
$\Delta\text{Rate}_t \times \text{Cut Rate}_{t-8,t-3}$			0.04***			0.05*
			(0.01)			(0.03)
Country fixed effects	✓	✓	✓	✓	✓	✓
Kleibergen-Paap Weak ID				49.52	49.33	16.25
Observations	1673	1673	1673	1673	1673	1673

U-shaped policy and crises: probit

back

	Dependent variable: $\text{Crisis}_{t \text{ to } t+2}$					
	Probit			Probit IV		
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta_3 \text{Rate}_t$	0.02***	0.02***	0.01*	0.03**	0.03*	0.00
	(0.00)	(0.00)	(0.01)	(0.01)	(0.02)	(0.02)
$\text{Cut Rate}_{t-8,t-3}$		0.07***	0.06**		0.06**	0.07**
		(0.03)	(0.02)		(0.03)	(0.03)
$\Delta_3 \text{Rate}_t \times \text{Cut Rate}_{t-8,t-3}$			0.02***			0.05**
			(0.00)			(0.03)
Country fixed effects	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓
Kleibergen-Paap Weak ID				70.49	75.14	31.80
Observations	1563	1563	1563	1563	1563	1563

U-shaped policy and crises: economic effects

back

Economic effects based on IV estimation in column (6):

- Δ_3Rate: a 1 percentage point 3-year increase in monetary rates is associated with a subsequent 1 percentage point higher crisis probability (insignificant).
- Cuts between t − 8 and t − 3 are associated with a 4% higher crisis probability (insignificant).
- A 1 percentage point 3-year increase in monetary rates following a five-year cut is associated with a subsequent 7 percentage point higher crisis probability.
- A sequence of a cut from t − 8 to t − 3 and then increasing rates by 1 percentage point over three years is associated with a 12 percentage points increase in crisis risk (the sum of the above), more than doubling the crisis probability compared to the sample mean of 10%

Does the depth of the U matter? back

- More granular analysis of the U
- Sort $\Delta_5 \text{Rate}_{t-3}$ and $\Delta_3 \text{Rate}_t$ both into terciles
- Crisis frequency increases the lower $\Delta_5 \text{Rate}_{t-3}$ and the higher $\Delta_3 \text{Rate}_t$

	Crisis frequency$_{t \text{ to } t+2}$ $\Delta_3 \text{Rate}_{i,t}$			Difference from median $\Delta_3 \text{Rate}_{i,t}$		
$\Delta_5 \text{Rate}_{i,t-3}$	(1) Low	(2) Medium	(3) High	(1) Low	(2) Medium	(3) High
Low	0.08	0.13	0.28	0.03	0.07*	0.22***
Medium	0.06	0.05	0.13	0.00	0.00	0.08
High	0.05	0.08	0.10	-0.01	0.03	0.05

Notes: Left panel: frequency of crises in 9 equal-sized bins of obs, sorted by past 5-year changes and current three-year change in rates. Upper right cell corresponds to U shape. Right panel: Differences relative to Medium-medium bin. Driscoll-Kraay standard errors with 5 lags.

Residual vs moderate U, detailed decomposition

	(1)	(2)	(3)	(4)
	Crisis	Deep crisis	Post-WW2 crisis	Post-WW2 deep crisis
Strong cut + Strong raise	0.28***	0.19***	0.25***	0.20***
Strong cut + moderate raise	0.07	0.04	0.00	0.00
Moderate cut + Strong raise	0.16	0.14*	0.19	0.19*
Moderate cut + moderate raise	0.11	0.04	0.08	0.00
Raise + raise	0.08	0.03	0.05	0.01
Raise + cut	0.03	0.02	0.02	0.00
Cut + cut	0.06	0.04	0.03	0.00
Unconditional	0.10	0.06	0.07	0.04

Back

Baron, Verner and Xiong (2021) crises

back

	Dependent variable: $\text{Crisis}_{t \text{ to } t+2}$							
	Full sample				Post-WW2			
	OLS		IV		OLS		IV	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta_3 \text{Rate}_t$	0.02**	0.01	0.06***	0.04**	0.02**	0.01***	0.04**	0.03
	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)
$\text{Cut Rate}_{t-8,t-3}$		0.03		-0.00		0.01		-0.02
		(0.04)		(0.04)		(0.04)		(0.04)
$\Delta_3 \text{Rate}_t \times \text{Cut Rate}_{t-8,t-3}$		0.03**		0.07***		0.02**		0.06**
		(0.01)		(0.03)		(0.01)		(0.03)
Country fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓	✓	✓
Kleibergen-Paap Weak ID			46.39	25.56			53.15	22.69
Observations	1626	1626	1626	1626	951	951	951	951

Excluding GFC in 2007/2008

back

	Pre-2000 sample - dependent variable: $\text{Crisis}_{t \text{ to } t+2}$					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta_3 \text{Rate}_t$	0.01*	0.01*	0.01	0.01	0.01	-0.00
	(0.01)	(0.01)	(0.00)	(0.02)	(0.02)	(0.01)
$\text{Cut Rate}_{t-8,t-3}$		0.03	0.03		0.03	0.03
		(0.02)	(0.02)		(0.03)	(0.03)
$\Delta_3 \text{Rate}_t \times \text{Cut Rate}_{t-8,t-3}$			0.02**			0.05**
			(0.01)			(0.02)
Country fixed effects	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓
Kleibergen-Paap Weak ID				40.71	36.98	20.89
Observations	1418	1418	1418	1418	1418	1418

Using average stance over 5-year/3-year window

back

- Low dummy for average stance relative to natural rate over t − 8 to t − 3 (similar results with continuous measure).

	Dependent variable: $\text{Crisis}_{t \text{ to } t+2}$					
	Full sample			Post-1945 sample		
	(1)	(2)	(3)	(4)	(5)	(6)
$(r - r^*)_{t-3,t}$	0.02**	0.02**	0.02**	0.02*	0.02**	0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
$\text{Low}(r - r^*)_{t-8,t-3}$		0.03	0.03		0.03	0.03
		(0.04)	(0.03)		(0.04)	(0.04)
$(r - r^*)_{t-3,t} \times \text{Low}(r - r^*)_{t-8,t-3}$			0.00			0.00
			(0.01)			(0.01)
Country fixed effects	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓
Observations	1895	1895	1895	1108	1108	1108

Controlling for stance at t-3

back

	Dependent variable: $\text{Crisis}_{t \text{ to } t+2}$					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta_3 \text{Rate}_t$	0.03***	0.03***	0.01**	0.04	0.04	0.01
	(0.01)	(0.01)	(0.01)	(0.03)	(0.03)	(0.02)
$\text{Cut Rate}_{t-8,t-3}$		0.06*	0.06*		0.05*	0.05*
		(0.03)	(0.03)		(0.03)	(0.03)
$\Delta_3 \text{Rate}_t \times \text{Cut Rate}_{t-8,t-3}$			0.03**			0.06**
			(0.01)			(0.03)
Deviation_{t-3}	1.53	1.70*	1.55*	2.32*	2.37**	2.06*
	(1.05)	(0.96)	(0.94)	(1.27)	(1.20)	(1.09)
Country fixed effects	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓
Kleibergen-Paap Weak ID				53.55	54.06	36.49
Observations	1626	1626	1626	1626	1626	1626

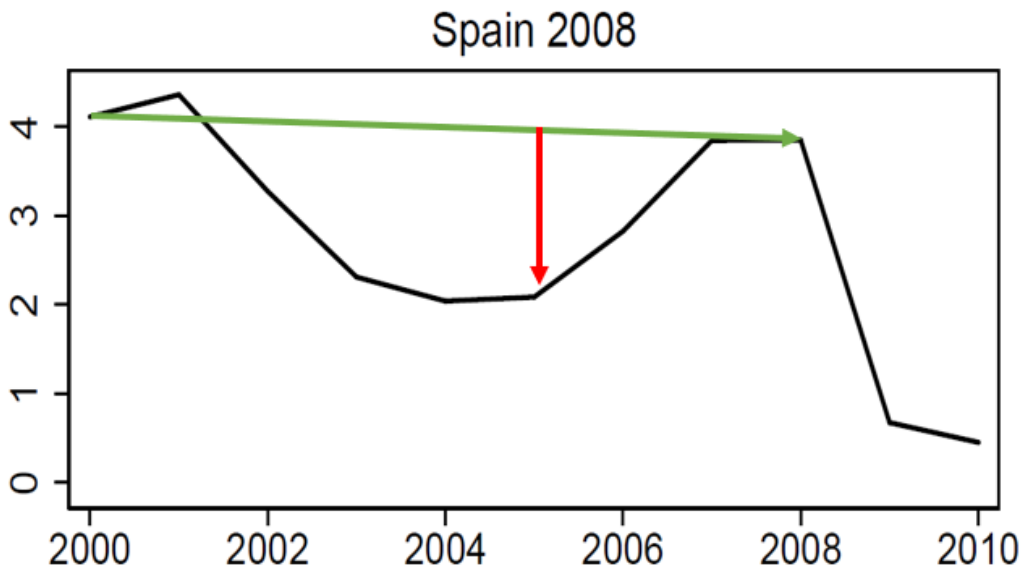
3×3 policy shapes, residual rates back

	Crisis frequency$_{t \text{ to } t+2}$ $\Delta_3 \text{Rate}_{i,t}$			Difference from median $\Delta_3 \text{Rate}_{i,t}$		
$\Delta_5 \text{Rate}_{i,t-3}$	(1) Low	(2) Medium	(3) High	(1) Low	(2) Medium	(3) High
Low	0.05	0.13	0.24	-0.03	0.04	0.15**
Medium	0.10	0.08	0.12	0.02	0.00	0.04
High	0.07	0.02	0.08	-0.02	-0.06**	-0.01

Notes: Left panel: frequency of crises in 9 equal-sized bins of obs, sorted by past 5-year and current three-year policy rate residuals. Upper right cell corresponds to U shape. Right panel: Differences relative to Medium-medium bin, Driscoll-Kraay standard errors with 5 lags.

U depth

- 8-year window, t = 2008 in this example
- Assume a constant trend (green line) from t – 8 to t
- U dummy: if actual rate (black) below green line at time t – 3
- Deep U dummy: if actual rate more than 1 percentage point below green line (red arrow larger than 1) at time t – 3



Crisis risk and the depth of the U

back

	Dependent variable: $\text{Crisis}_{\text{t to t+2}}$			
	(1)	(2)	(3)	(4)
$\Delta\text{Rate}_{t-8,t}$	0.01**	0.01**	0.01**	0.01**
	(0.00)	(0.00)	(0.00)	(0.00)
$U_{t-8,t-3,t}$	0.07***	0.03*	0.07***	0.04*
	(0.02)	(0.02)	(0.02)	(0.02)
Deep $U_{t-8,t-3,t}$		0.09***		0.07***
		(0.02)		(0.02)
Country fixed effects	✓	✓	✓	✓
Controls	✓	✓	✓	✓
Observations	1903	1903	1835	1835

Main specification with systematic/residual cuts

back

- Baseline regression with two different dummies for cuts based on residuals.

	Dependent variable: $\text{Crisis}_{t \text{ to } t+2}$					
	All cuts (baseline)		Residual cuts		Systematic cuts	
	OLS (1)	IV (2)	OLS (3)	IV (4)	OLS (5)	IV (6)
$\Delta_3 \text{Rate}_t$	0.01*	0.01	0.01*	0.01	0.02**	0.02
	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)
$\text{Cut}_{t-8,t-3}$	0.07*	0.06*	0.08**	0.05	0.03	0.03
	(0.04)	(0.04)	(0.03)	(0.03)	(0.05)	(0.05)
$\Delta_3 \text{Rate}_t \times \text{Cut}_{t-8,t-3}$	0.03**	0.07**	0.02***	0.09**	0.02	0.04
	(0.01)	(0.03)	(0.01)	(0.04)	(0.02)	(0.05)
Country fixed effects	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓
Kleibergen-Paap Weak ID		28.99		20.87		36.77
Observations	1322	1322	1322	1322	1322	1322

$X_{i,t}$ contains 8 lags of yearly real GDP growth and inflation (country and sample average), and a crisis dummy. Driscoll-Kraay s.e. with 5 lags.

Main specification with residual raises

▸ back

- Residual raises strongly linked to crisis risk.

	Dependent variable: $\text{Crisis}_{t \text{ to } t+2}$				
	All raises (baseline)		Residual raises		Systematic raises
	OLS (1)	IV (2)	OLS (3)	IV (4)	OLS (5)
$\Delta_3 \text{Rate}_t$	0.01*	0.01	-0.01	0.00	0.02**
	(0.01)	(0.02)	(0.01)	(0.03)	(0.01)
$\text{Cut}_{t-8,t-3}$	0.07*	0.06*	0.07*	0.04	0.08*
	(0.04)	(0.04)	(0.04)	(0.03)	(0.04)
$\Delta_3 \text{Rate}_t \times \text{Cut}_{t-8,t-3}$	0.03**	0.07**	0.04**	0.11**	0.01
	(0.01)	(0.03)	(0.02)	(0.05)	(0.01)
Country fixed effects	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓
Kleibergen-Paap Weak ID		28.99		11.04	
Observations	1322	1322	1322	1322	1322

$X_{i,t}$ contains 8 lags of yearly real GDP growth and inflation (country and sample average), and a crisis dummy.

Driscoll-Kraay s.e. with 5 lags.

▸ Residual cuts & residual raises

Main specification with residual cuts and raises

- Baseline regression with two different dummies for cuts based on residuals. Back

	Dependent variable: $\text{Crisis}_{t \text{ to } t+2}$				
	All raises (baseline)		Residual raises		Systematic raises
	OLS (1)	IV (2)	OLS (3)	IV (4)	OLS (5)
$\Delta_3 \text{Rate}_t$	0.01*	0.01	-0.01	0.01	0.02***
	(0.01)	(0.02)	(0.01)	(0.03)	(0.01)
Residual $\text{Cut}_{t-8,t-3}$	0.08**	0.05	0.08***	-0.02	0.11***
	(0.03)	(0.03)	(0.03)	(0.06)	(0.04)
$\Delta_3 \text{Rate}_t \times$ Residual $\text{Cut}_{t-8,t-3}$	0.02***	0.09**	0.05***	0.15*	-0.00
	(0.01)	(0.04)	(0.01)	(0.08)	(0.01)
Country fixed effects	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓
Kleibergen-Paap Weak ID		20.87		5.38	
Observations	1322	1322	1322	1322	1322

$X_{i,t}$ contains 8 lags of yearly real GDP growth and inflation (country and sample average), and a crisis dummy. Driscoll-Kraay s.e. with 5 lags.

Monetary rate cuts & low-spread credit expansions

back

	Dependent variable: Credit boom$_{t+1 \text{ to } t+3}$							
	Low-spread credit boom				High-spread credit boom			
	OLS (1)	IV (2)	OLS (3)	IV (4)	OLS (5)	IV (6)	OLS (7)	IV (8)
ΔRate$_{t-5,t}$	-1.06*	-6.33***			0.30	0.27		
	(0.58)	(2.38)			(1.09)	(1.86)		
Cut Rate$_{t-5,t}$			0.08**	0.51**			0.05	-0.02
			(0.04)	(0.24)			(0.04)	(0.15)
Country fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓	✓	✓
KP Weak ID		50.83		15.50		41.35		17.32
Observations	540	488	540	488	540	488	540	488

- Monetary rate cuts increase the likelihood of ending up in a low-spread credit boom (defined as $\geq$ 80th pctile credit growth, and below-country-mean level of spreads)

LP set up

$$\Delta_h y_{i,t+h} = \alpha_{i,h} + \alpha_{d,h} + \beta_h \Delta \text{Rate}_{i,t} + \sum_{L=0}^{L=4} \gamma_L X_{i,t-L} + \epsilon_{i,t+h}, \quad h \in \{1, ..., 5\}.$$

- $\Delta_h y_{i,t+h}$ is the change in credit or asset prices
- Controls: credit, asset prices, GDP, inflation (contemporaneous + 4 lags); interest rates (4 lags)
- We reverse the sign on ΔRate

▸ back

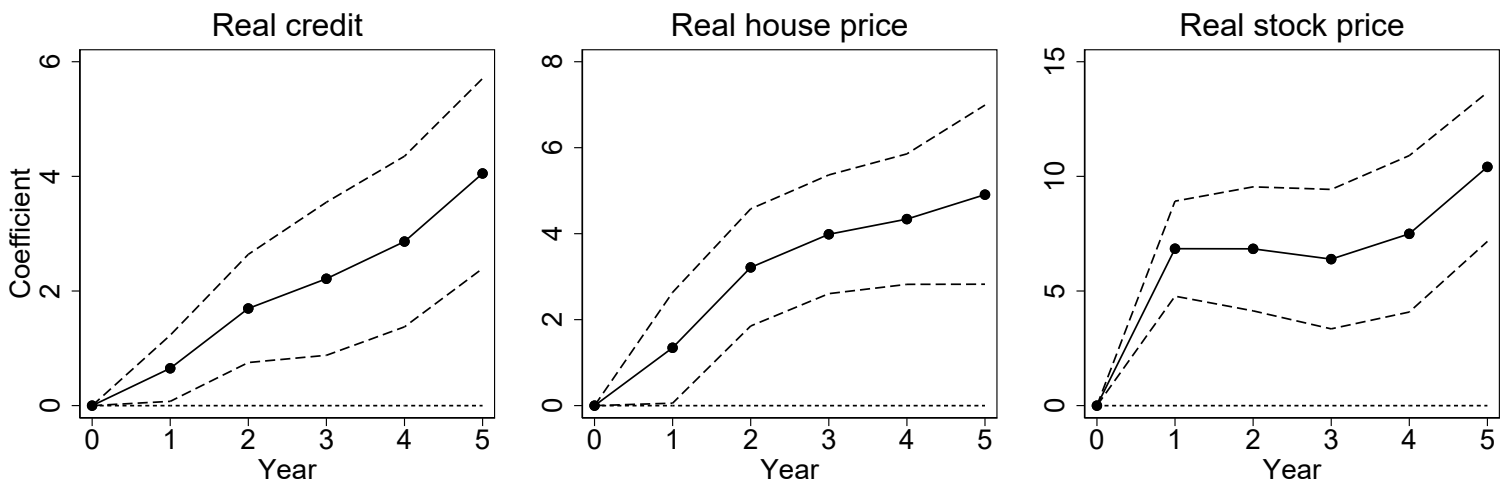
Boom: credit & AP response to rate cuts

back

$$\Delta_h y_{i,t+h} = \alpha_{i,h} + \alpha_{d,h} + \beta_h \Delta \text{Rate}_{i,t} + \sum_{L=0}^{L=4} \gamma_L X_{i,t-L} + \epsilon_{i,t+h}, \quad h \in \{1, ..., 5\}.$$

(a) Raw:

(b) Instrumented:



Rate cuts increase the likelihood of future R-zones

back

- Monetary rate cuts increase the likelihood of ending up in the R-zone over the next 3 years

	R-Zone Either$_{t+1 \text{ to } t+3}$							
	ΔRate$_{t-5,t}$		Cut Rate$_{t-5,t}$		ΔResidual Rate$_{t-5,t}$		Exc. Cut Rate$_{t-5,t}$	
	OLS (1)	IV (2)	OLS (3)	IV (4)	OLS (5)	IV (6)	OLS (7)	IV (8)
See header	-0.02***	-0.05***	0.07**	0.34**	-0.02***	-0.06**	0.05	0.36**
	(0.01)	(0.02)	(0.04)	(0.15)	(0.01)	(0.03)	(0.03)	(0.17)
Country fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓	✓	✓
Kleibergen-Paap		43.48		54.67		57.52		33.85
Observations	1335	1335	1335	1335	1247	1247	1247	1247

What are the mechanisms linking MP-cuts & R-zones?

▸ back

- Credit expansions with low spreads & poor outcomes
  - MP cuts $\Rightarrow \uparrow$ likelihood of low-spread credit boom ($\geq$ 80th pctile credit growth & below-country-mean spreads) ▸ low-spread booms
  - Low-spread credit booms are not associated with better outcomes (loan losses, RoE, crises) ▸ outcomes
- Rising valuations of bank stocks & stable capital ratios
  - Boom-bust in bank returns & sentiment around pre-cut R-zones, larger than for non-financials ▸ stock returns
  - Flat capital ratios
- Consistent with $\uparrow$ credit supply & overoptimism

Rate cuts and low-spread credit expansions

back

	Dependent variable: Credit boom$_{t+1 \text{ to } t+3}$							
	Low-spread credit boom				High-spread credit boom			
	OLS (1)	IV (2)	OLS (3)	IV (4)	OLS (5)	IV (6)	OLS (7)	IV (8)
ΔRate$_{t-5,t}$	-1.06*	-6.33***			0.30	0.27		
	(0.58)	(2.38)			(1.09)	(1.86)		
Cut Rate$_{t-5,t}$			0.08**	0.51**			0.05	-0.02
			(0.04)	(0.24)			(0.04)	(0.15)
Country fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓	✓	✓
KP Weak ID		50.83		15.50		41.35		17.32
Observations	540	488	540	488	540	488	540	488

- MP rate cuts ↑ likelihood of a low-spread credit boom ($\geq$ 80th pctile credit growth & below-country-mean spreads)

Low-spread credit expansions and subsequent outcomes

back

Dependent variable:	$\text{Crisis}_{t \text{ to } t+2}$		$\Delta\ \text{RoE}_{t \text{ to } t+2}$		$\Delta\ \text{NPL}_{t \text{ to } t+2}$	
	Low (1)	High (2)	Low (3)	High (4)	Low (5)	High (6)
$\text{Credit boom}_{t-3 \text{ to } t-1}$	0.16**	0.07**	-5.48***	-1.65*	0.45***	0.31**
	(0.06)	(0.03)	(1.51)	(0.93)	(0.11)	(0.14)
Country fixed effects	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓
Observations	660	660	622	622	482	482

- Low-spread boom $\Rightarrow$ higher crisis risk, lower RoE, higher loan losses; more so than for high-spread booms

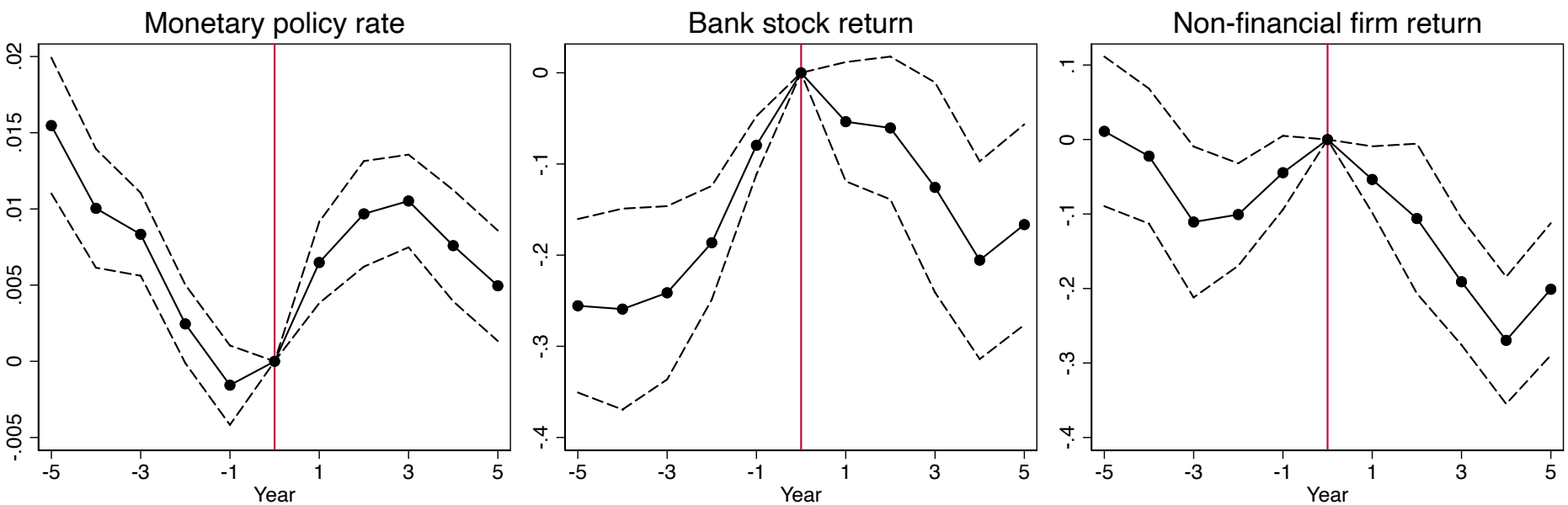
Bank & non-fin. returns around pre-cut R-zones

back

$$y_{i,t+h} - y_{i,t} = \alpha_{i,h} + \alpha_{d,h} + \beta_h \mathbb{1}_{\text{Enter Pre-cut R-zone}_{i,t}=1} + \epsilon_{i,t+h}$$

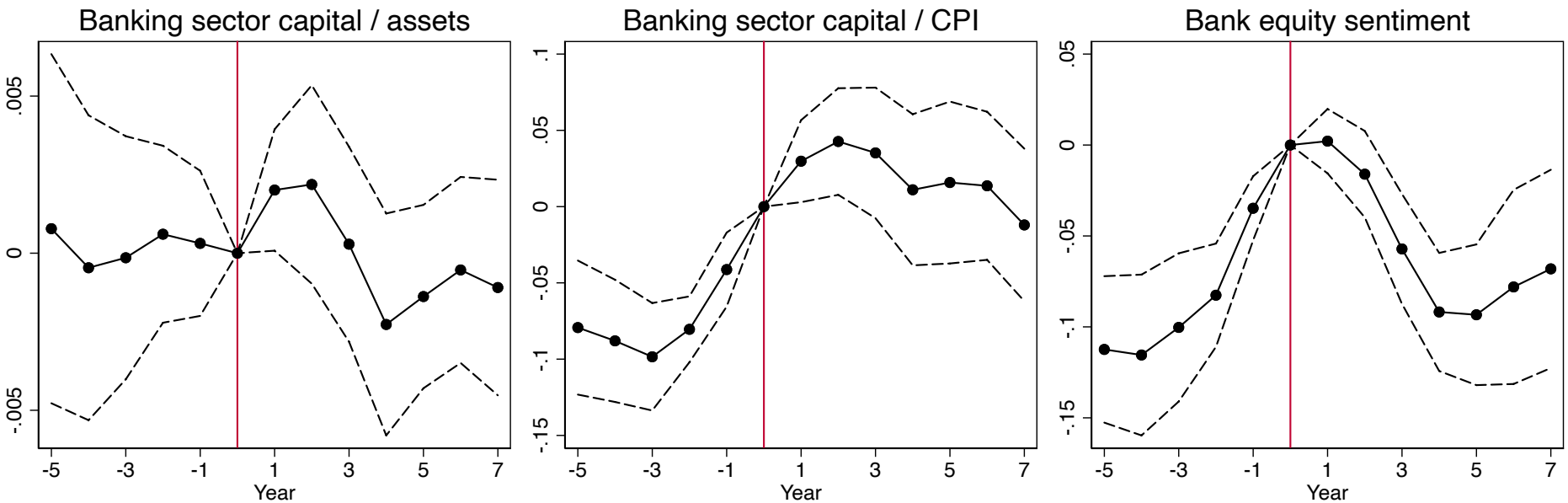
- Conditional on entering pre-cut R-zone at $t = 0$: bank stock boom before, bank & non-fin. crash after

All r-zones



Bank capital and bank equity sentiment around pre-cut R-zones

back

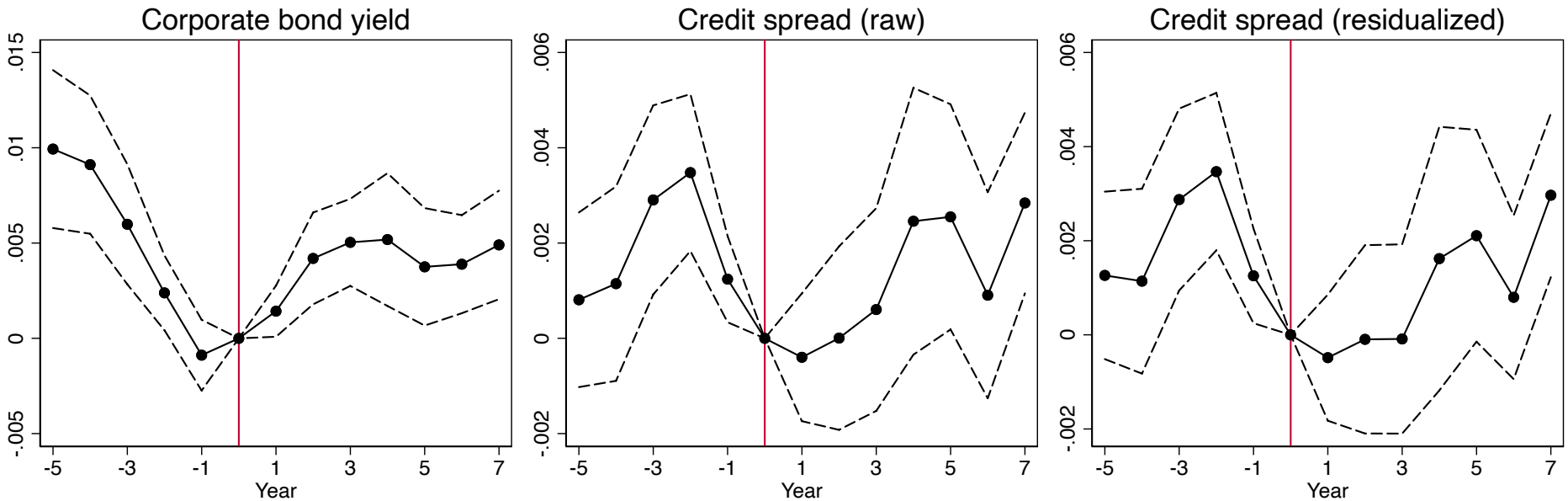


- High bank equity market sentiment: predictably low future bank stock returns (Baron and Xiong, 2017; López-Salido et al., 2017)
- Low spreads, high bank-specific returns & sentiment; flat capital ratios consistent with ↑ credit supply & overoptimism

spreads sentiments

Corporate bond spreads around pre-cut R-zones

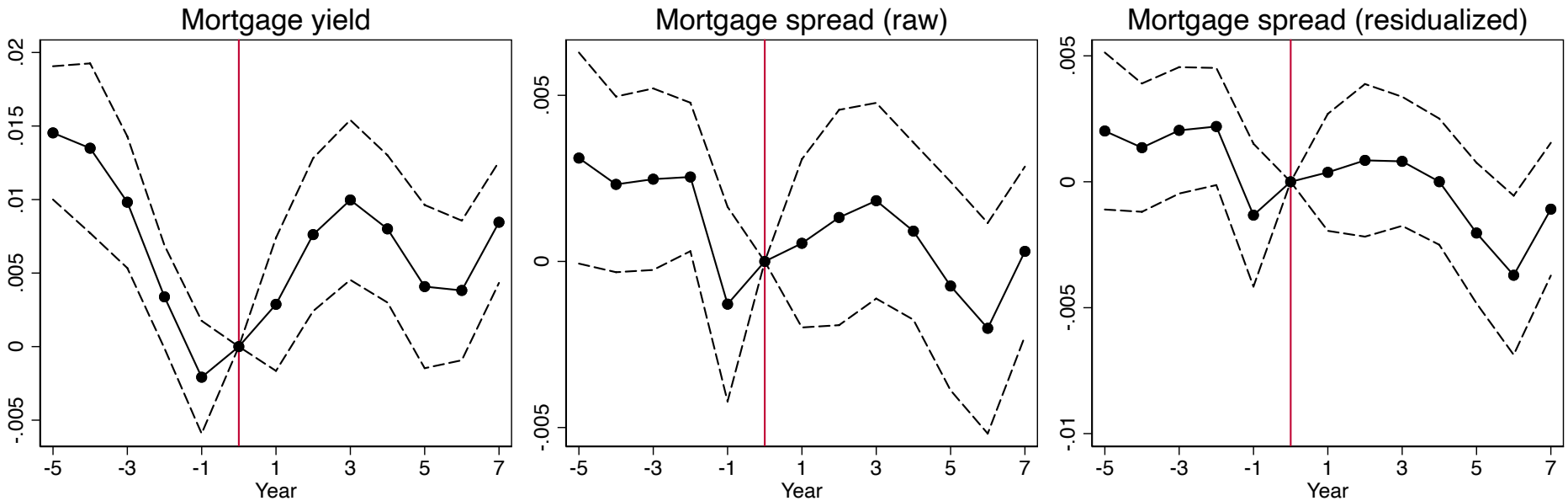
back



- Falling spreads & cost of credit when credit & asset prices are growing (t = -3 to 0)

Mortgage spreads around pre-cut R-zones

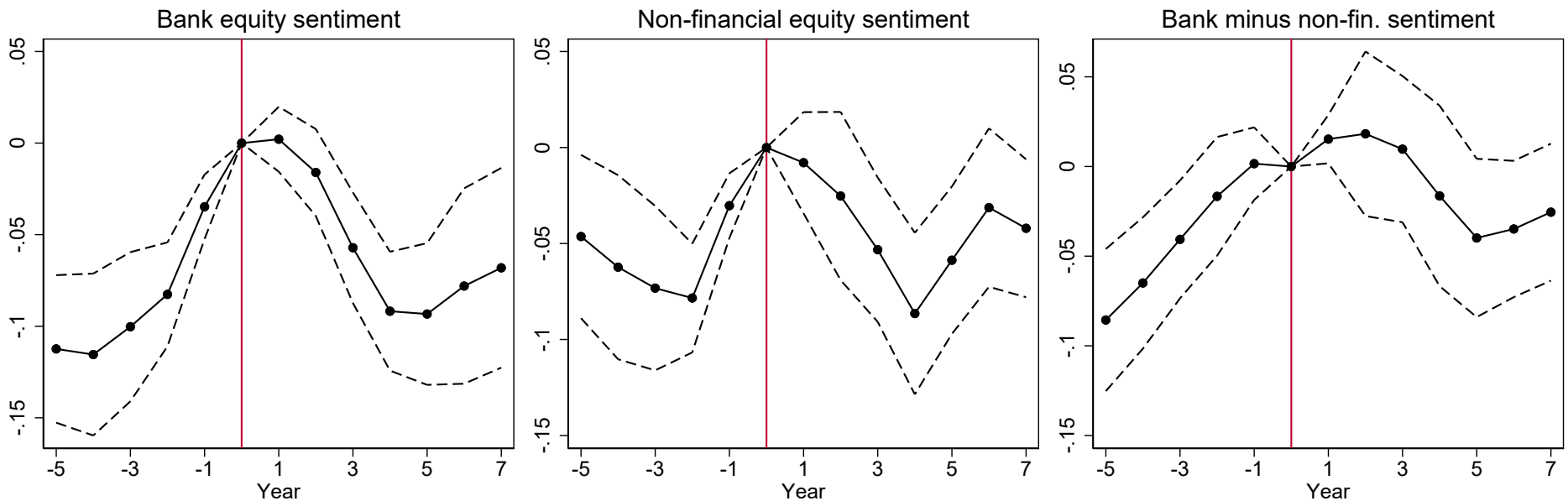
back



- Falling spreads & cost of credit when credit & asset prices are growing (t = -3 to 0)

Bank & non-financial sentiment around pre-cut R-zones

back



- Higher sentiment in R-zone, reversal after, especially for banks

Does monetary policy before the R-zone matter when raising? back

- Raising rates in R-zone increases crisis risk only if the R-zone was preceded by a rate cut

	Dependent variable: $\text{Crisis}_{t \text{ to } t+2}$								
	R-zone			R-zone, pre cut			R-zone, pre raise		
	OLS		IV	OLS		IV	OLS		IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$\text{R-Zone}_{t-3 \text{ to } t-1}$	0.12***	0.04*	-0.08	0.17***	0.06*	-0.03	0.01	-0.01	-0.08
	(0.02)	(0.02)	(0.08)	(0.04)	(0.03)	(0.10)	(0.04)	(0.02)	(0.12)
$I(\Delta_3 \text{Rate}_t \geq 0)$		0.05**	-0.10		0.06**	-0.07		0.10***	0.04
		(0.02)	(0.07)		(0.02)	(0.08)		(0.02)	(0.08)
$\text{R-Zone}_{t-3 \text{ to } t-1} \times I(\Delta_3 \text{Rate}_t \geq 0)$		0.16***	0.41**		0.20***	0.41**		0.04	0.19
		(0.05)	(0.17)		(0.07)	(0.20)		(0.08)	(0.27)
Country fixed effects	✓	✓	✓	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Kleibergen-Paap Weak ID			21.14			17.36			2.71
Observations	1474	1474	1474	1474	1474	1474	1474	1474	1474

MP rates in the R zone and crisis frequencies

	(1)	(2)	(3)	(4)
	Crisis	Deep crisis	Post-WW2 crisis	Post-WW2 deep crisis
Raise in R-zone	0.26 (11/42)	0.19 (8/42)	0.26 (9/35)	0.20 (7/35)
Cut in R-zone	0.06 (2/36)	0.00 (0/36)	0.04 (1/27)	0.00 (0/27)
Raise outside of R-zone	0.10 (23/233)	0.05 (12/233)	0.04 (6/135)	0.02 (3/135)
Cut outside of R-zone	0.04 (13/325)	0.02 (8/325)	0.02 (3/187)	0.00 (0/187)
Unconditional	0.08 (49/636)	0.04 (28/636)	0.05 (19/383)	0.03 (10/383)

back

Raising rates in the R-zone – continuous raises

	Dependent variable: $\text{Crisis}_{t \text{ to } t+2}$					
	All raises			Residual raises		Systematic raises
	OLS (1)	OLS (2)	IV (3)	OLS (4)	IV (5)	OLS (6)
$\text{R-Zone}_{t-3 \text{ to } t-1}$	0.13***	0.13***	0.13***	0.13***	0.12***	0.13***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)
$\Delta_3 \text{Rate}_t$		0.01	0.01	-0.00	0.00	0.01***
		(0.01)	(0.02)	(0.01)	(0.02)	(0.00)
R-Zone $\times$ Δ_3Rate		0.03***	0.05**	0.03**	0.09*	0.02***
		(0.01)	(0.02)	(0.02)	(0.05)	(0.01)
Country fixed effects	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓
Kleibergen-Paap Weak ID			13.89		13.72	
Observations	1351	1351	1351	1351	1351	1351

▸ Back

MP rates before the R zone & crisis frequencies

	(1)	(2)	(3)	(4)
	Crisis	Deep crisis	Post-WW2 crisis	Post-WW2 deep crisis
R-zone preceded by cut	0.29 (15/52)	0.19 (10/52)	0.29 (12/41)	0.19 (8/41)
R-zone preceded by raise	0.04 (1/27)	0.00 (0/27)	0.05 (1/21)	0.00 (0/21)
Cut not followed by R-zone	0.09 (23/269)	0.06 (16/269)	0.05 (7/148)	0.03 (5/148)
Raise not followed by R-zone	0.07 (19/283)	0.04 (12/283)	0.02 (3/173)	0.00 (0/173)
Unconditional	0.09 (58/631)	0.06 (38/631)	0.06 (23/383)	0.03 (13/383)

back

Residual U-MP & R-zone combination crucial

back

	(1)	(2)	(3)	(4)
	Crisis	Deep crisis	Post-WW2 crisis	Post-WW2 deep crisis
Residual U-MP & R-zone	0.46*** (14/31)	0.32*** (10/31)	0.43*** (10/23)	0.35*** (8/23)
Systematic U-MP & R-zone	0.20 (3/13)	0.12 (2/13)	0.23* (2/10)	0.17* (2/10)
U-shaped MP & no R-zone	0.09 (7/79)	0.07 (5/79)	0.07 (3/46)	0.05 (2/46)
No U-shaped MP & R-zone	0.10 (8/81)	0.05 (4/81)	0.06 (4/68)	0.01 (1/68)
No U-shaped MP & no R-zone	0.04 (11/264)	0.03 (7/264)	0.02 (4/187)	0.00 (0/187)
Unconditional	0.09 (44/469)	0.06 (27/469)	0.07 (24/334)	0.04 (13/334)

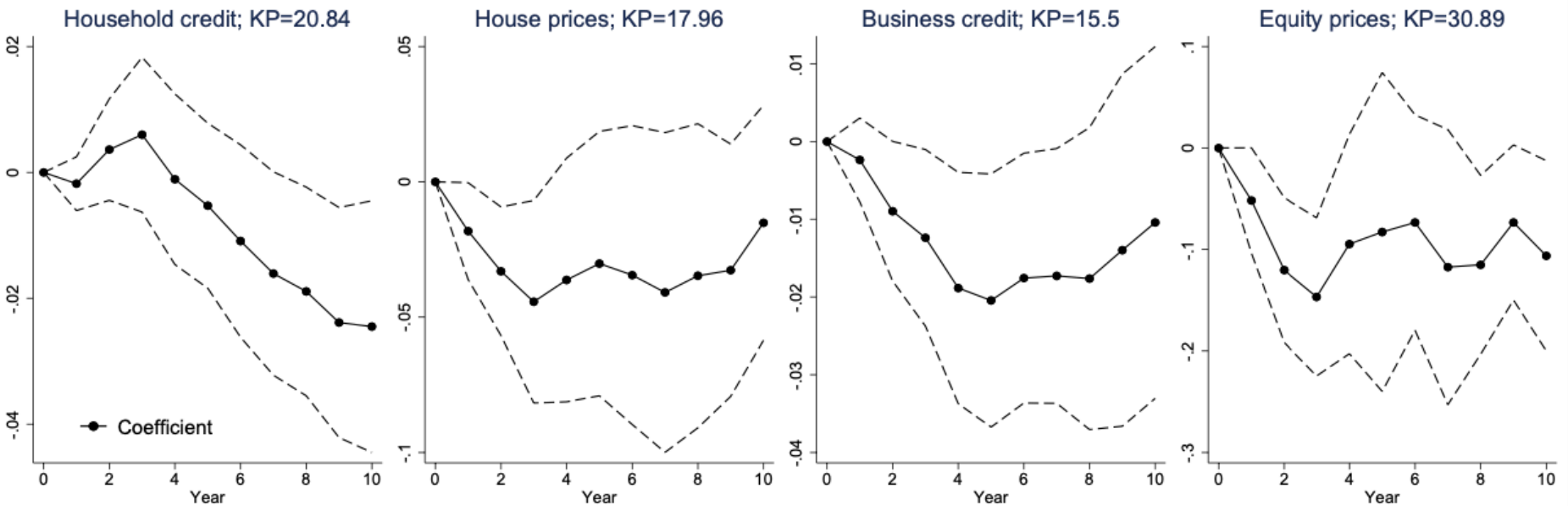
Crisis frequencies: U-MP & R zone alternative timing $t-5$ to t

	(1)	(2)	(3)	(4)
	Crisis	Deep crisis	Post-WW2 crisis	Post-WW2 deep crisis
U-shaped MP & R-zone	0.32 (19/60)	0.21 (13/60)	0.32 (13/40)	0.25 (10/40)
U-shaped MP & no R-zone	0.09 (10/107)	0.07 (8/107)	0.05 (3/51)	0.04 (2/51)
No U-shaped MP & R-zone	0.09 (14/148)	0.05 (8/148)	0.05 (5/103)	0.01 (1/103)
No U-shaped MP & no R-zone	0.05 (15/319)	0.03 (8/319)	0.02 (4/188)	0.00 (0/188)
Unconditional	0.09 (58/633)	0.06 (36/633)	0.06 (24/382)	0.03 (13/382)

back

Reversal in pre-existing vulnerabilities – IV

back



Policy rate path and the risk of bank equity crises

back

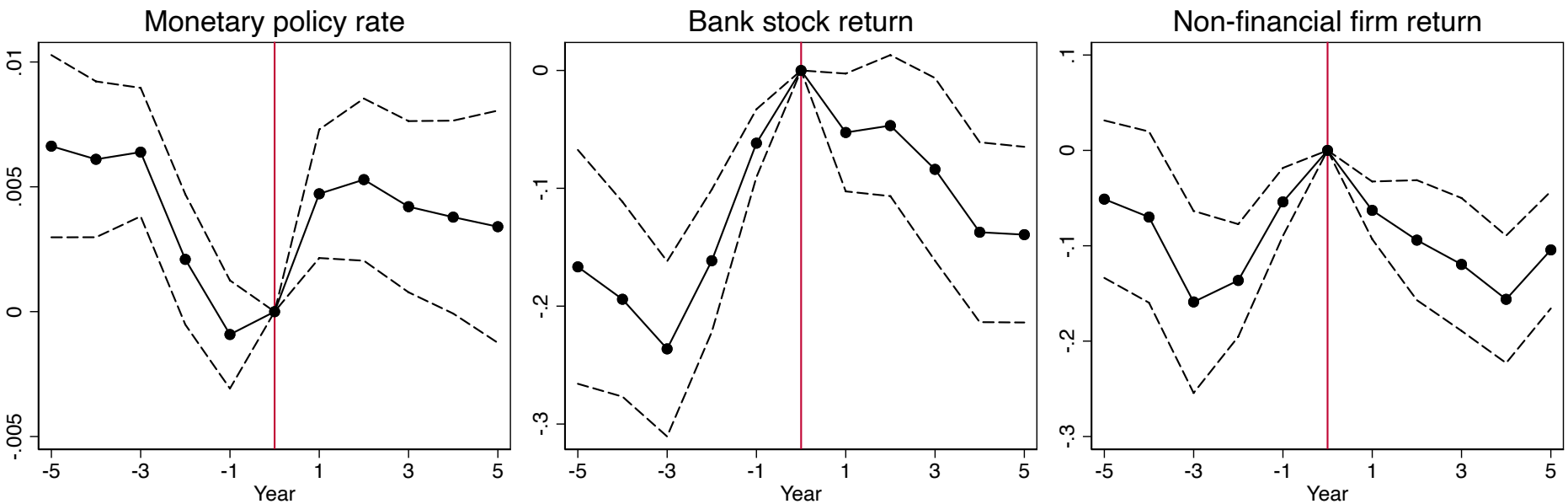
- Dependent variable: dummy = 1 if cumulative bank stock return $\leq -30\%$ (Baron et al., 2021)

	Dependent variable: Bank equity crisis$_{t \text{ to } t+2}$					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta_3 \text{Rate}_t$	0.01***	0.01***	0.00	0.02**	0.02**	-0.00
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Cut $\text{Rate}_{t-8,t-3}$		0.04**	0.04**		0.03**	0.04**
		(0.02)	(0.02)		(0.02)	(0.02)
$\Delta_3 \text{Rate}_t \times$ Cut $\text{Rate}_{t-8,t-3}$			0.02***			0.06**
			(0.01)			(0.03)
Country fixed effects	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓
Kleibergen-Paap Weak ID				81.57	83.26	36.60
Observations	1624	1624	1624	1624	1624	1624

Bank & non-fin. returns & MP rates around all R-zones

back

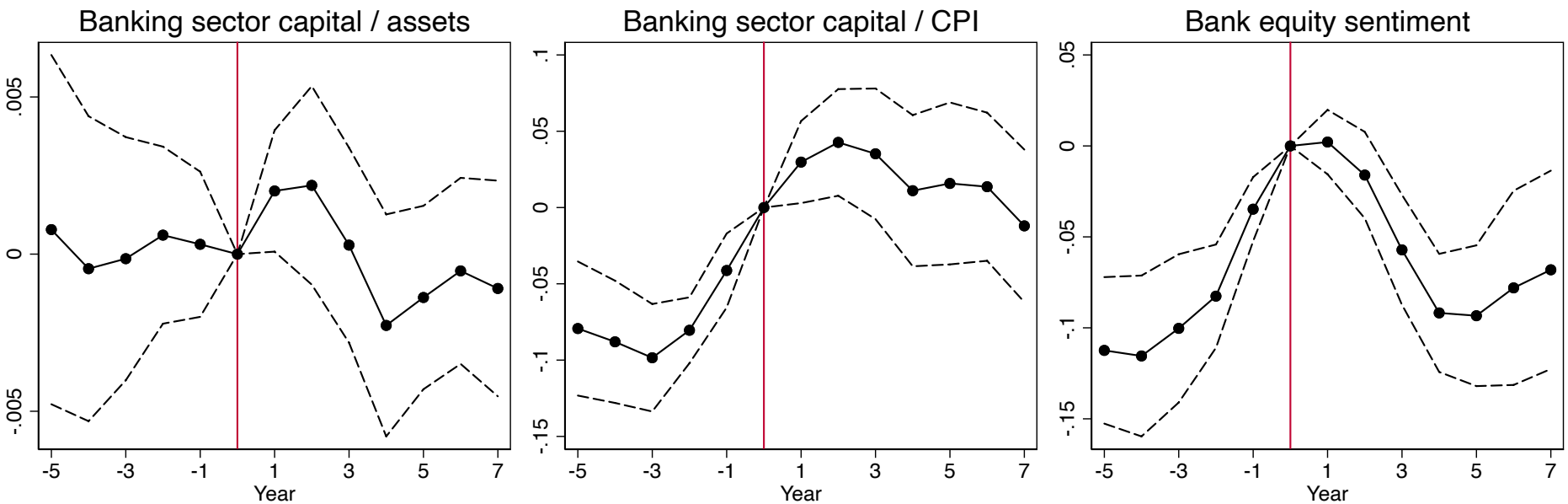
$$y_{i,t+h} - y_{i,t} = \alpha_{i,h} + \alpha_{d,h} + \beta_h \mathbb{1}_{\text{Enter R-zone}_{i,t}=1} + \epsilon_{i,t+h}$$



Bank capital and bank equity sentiment around R-zones

back

$$y_{i,t+h} - y_{i,t} = \alpha_{i,h} + \alpha_{d,h} + \beta_h \mathbb{1}_{\text{Enter pre-cut R-zone}_{i,t}=1} + \epsilon_{i,t+h}$$



- Bank equity market sentiment: (minus) predictable component of bank stock return (using past credit growth & price-dividend ratios, see Baron and Xiong, 2017; López-Salido et al., 2017)
- High sentiment means predictably low future returns

Administrative data: summary statistics

back

		Mean (1)	S.D. (2)	P25 (3)	Median (4)	P75 (5)
Loan default$_{t,t+1}$	0/1	0.019	0.135	0.000	0.000	0.000
ΔRate$_{t,t+1}$	%	-0.326	1.093	-0.906	-0.143	0.245
Cut Rate$_{t-5,t}$	0/1	0.427	0.495	0.000	0.000	1.000
Short maturity	0/1	0.503	0.500	0.000	1.000	1.000
Firm bad credit history	0/1	0.109	0.311	0.000	0.000	0.000
Construction & real estate firm	0/1	0.214	0.410	0.000	0.000	0.000
Firm not in Mercantile Register the previous year	0/1	0.246	0.431	0.000	0.000	0.000
Firm average cost of credit	%	3.190	2.801	1.052	2.597	4.610
Bank NPL Ratio	0.0x	0.043	0.051	0.008	0.017	0.061

Monetary policy path & loan-level defaults in Spain – demeaned variables

back

	Dependent variable: Loan default$_{t+1 \text{ to } t+3}$								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Δ_3 Rate$_{t,t+3}$	0.001*	0.001**	0.002***	0.003***	0.003***	0.003***	0.003***	0.003***	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Cut Rate$_{t-5,t}$	0.012***	0.010***	0.011***	0.007***	0.007***	0.007**	0.008***	0.008***	0.014***
	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Δ_3 Rate$_{t,t+3}$ × Cut Rate$_{t-5,t}$		0.003**	0.004***	0.003**	0.003***	0.002**	0.003***	0.004***	0.007***
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Industry × Location FE	No	No	Yes	Yes	-	Yes	-	-	-
Bank Controls	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	No	No	No	No	No	Yes	Yes	-	-
Firm FE	No	No	No	No	Yes	No	Yes	-	-
Firm × Bank FE	No	No	No	No	No	No	No	Yes	Yes
Firm Controls	No	No	No	No	No	No	No	No	Yes
Observations	1.1m	1.1m	1.1m	1.1m	1.1m	1.1m	1.1m	1.1m	0.7m
R^2	0.031	0.031	0.220	0.220	0.353	0.221	0.354	0.551	0.584

U-shaped policy and defaults: economic effects

back

- A 1 percentage point change in the monetary interest rate after loan origination increases the 3-year probability of loan delinquency by 7.4% in relative terms (given that the average default probability equals 4.5 percentage points).
- The probability of loan delinquency increases by 17.1% if monetary rates were cut around loan origination (from the coefficient on the Cut dummy).
- A 1 percentage point increase in the monetary policy rate after periods of declining policy rates raises the probability of loan default by 8.1%.
- Summing together the coefficients, the probability of delinquency increases by 32.6% if at origination, the Cut dummy is one, and monetary rates increase by 1 percentage point over the following three years.