

BANKS' RESPONSE TO NEGATIVE INTEREST RATES: EVIDENCE FROM THE SWISS EXEMPTION THRESHOLD

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^a: The views expressed in this paper are solely the responsibility of the authors and should not be interpreted as reflecting the official views of FINMA.

Motivation

- several central banks have introduced **negative policy rates** since 2014 (ECB, SNB, Riksbank, Denmark's NB)
- little evidence on **transmission & implications** for ...
 - ... banks' balance sheet restructuring,
 - ... income,
 - ... risk-taking

Notable exception: [Heider et al. \(2017\)](#) on syndicated lending in the Euro area

- theoretical guidance is limited as well

Recent exception: [Brunnermeier & Koby \(2017\)](#) on ZLB vs. 'reversal rate'

Research Questions

- Do negative rates cause a restructuring of banks' balance sheets, and what does it look like?
 - Do they lead to changes in **lending/investment** behaviour?
 - Do they hurt **profitability**?
 - Might they incentivize increased **risk-taking**?
- Are the effects heterogeneous across banks?

Results

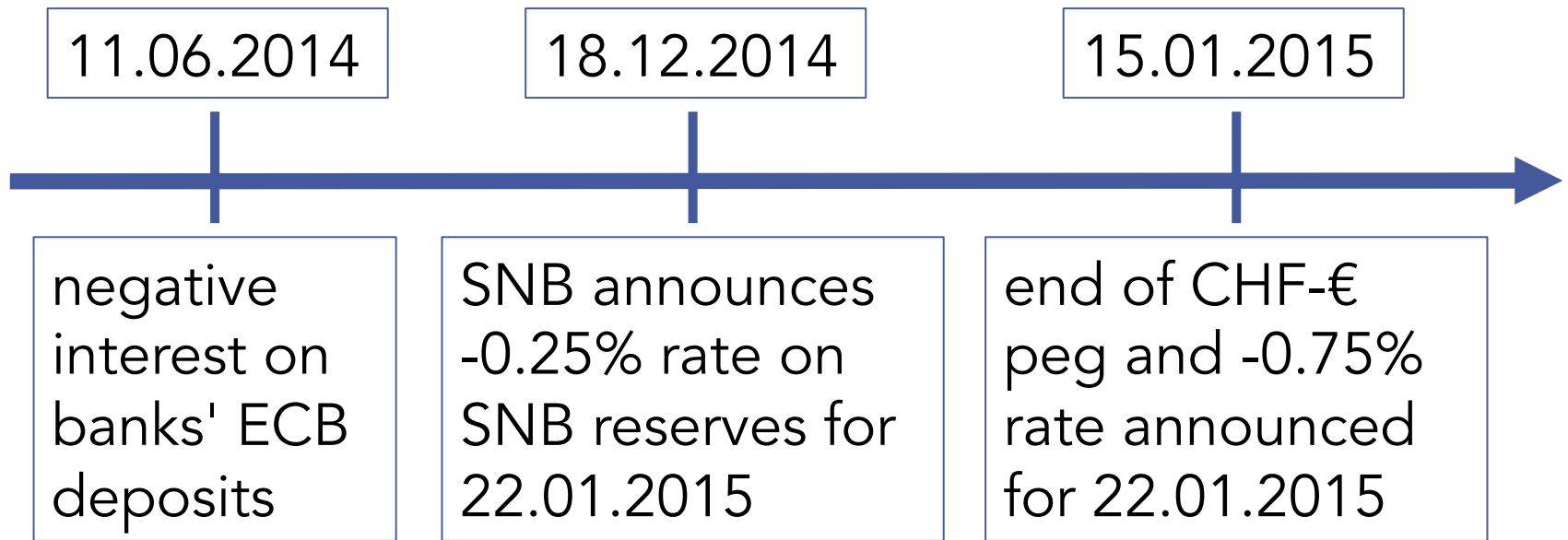
For Swiss retail banks, we ...

- ... document the **transmission** of negative rates to the interbank market.
- ... find an **increase in mortgage lending** (not corporate).
- ... identify a conflict with the phase-in of the LCR.
- ... test the 'reversal rate' hypothesis.
- ... test the effect on deposit-taking banks.
- ... identify preliminary evidence on squeezed net interest income, offsetting fees, and more risk-taking.

Contribution

- detailed bank-level evidence for retail banks
 - we observe **balance sheets of all Swiss retail banks at monthly frequency**
 - SNB (2016): squeezed liability margins & higher asset margins in aggregate data
 - Heider et al. (2017): negative Eurozone rates have increased risk-taking for banks that are active in the syndicated loan market
- directly observed treatment intensity
 - Heider et al. (2017): assume limited pass-through for HH deposits, so that deposit ratio = treatment intensity

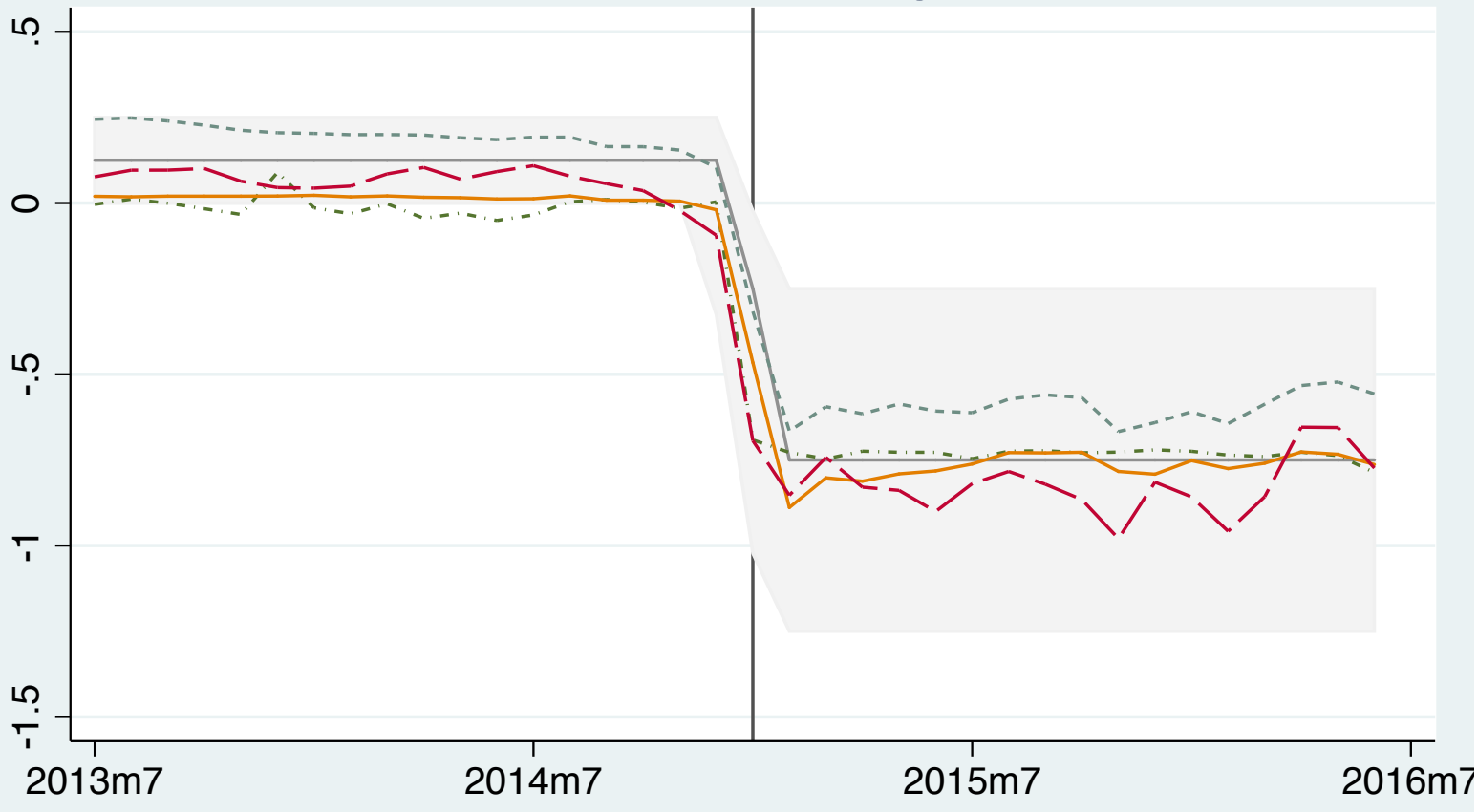
Switzerland



neg. rates apply to reserves > 20 * min. reserve requirement

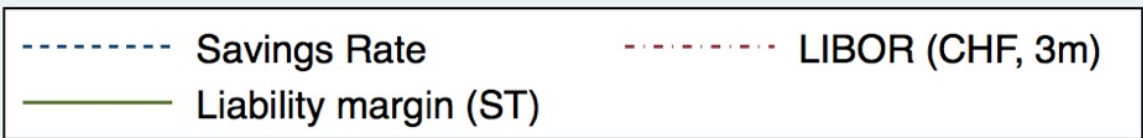
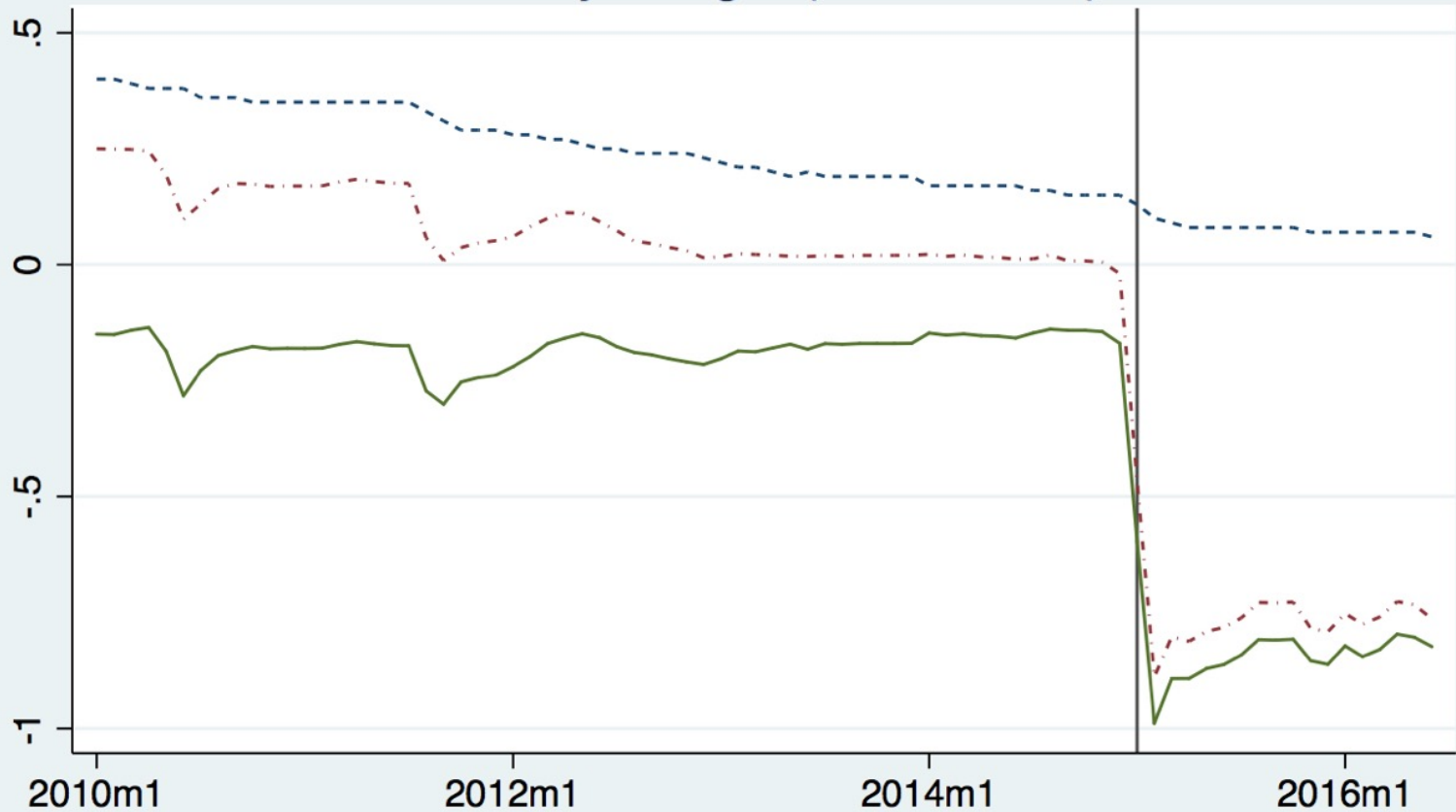
Switzerland

Short-Term Borrowing Rates



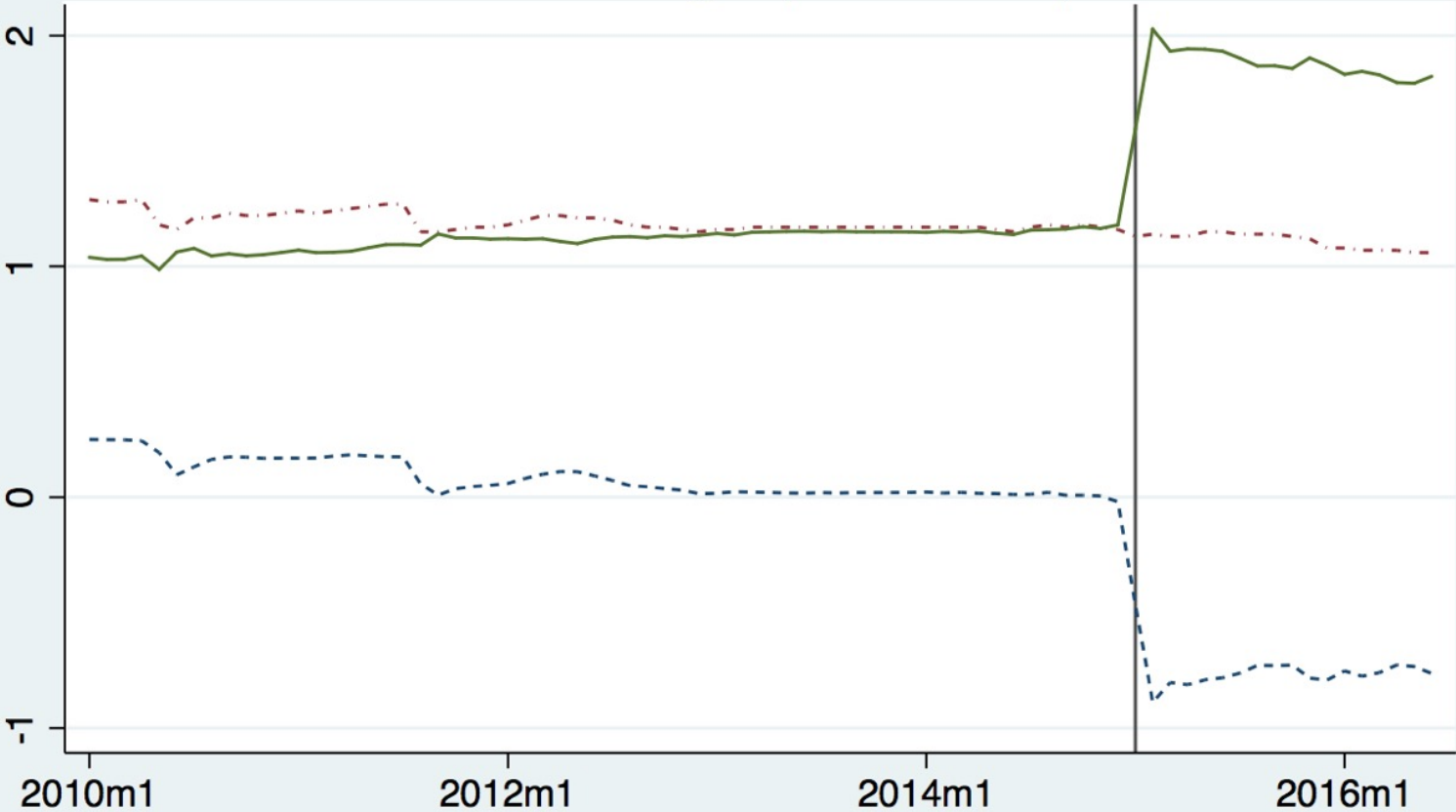
Switzerland

Liability Margin (Short-Term)



Switzerland

Asset Margin (Short-Term)



- Initial Balance Sheet

<i>SNB Reserves</i>	<i>Equity</i>
<i>Other</i>	<i>Deposits</i>
	<i>Other Debt</i>

- Initial Balance Sheet

<i>SNB Reserves</i>	<i>Equity</i>
<i>min. res. req. (MRR)</i>	
<i>Other Assets</i>	<i>Deposits</i>
	<i>Other Debt</i>

- Initial Balance Sheet

<i>Exposed Reserves</i>	<i>Equity</i>
$20 * MRR$	<i>Deposits</i>
<i>Other Assets</i>	<i>Other Debt</i>

- negative rates are charged only on **exposed reserves (ER)**

- Initial Balance Sheet

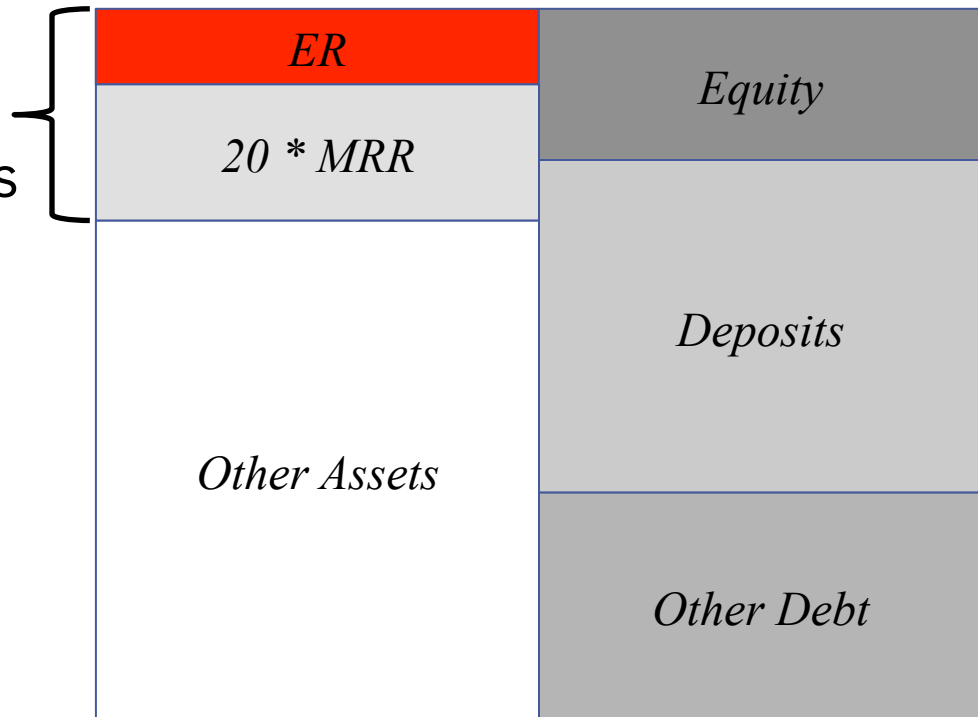
<i>Exposed Reserves</i>	<i>Equity</i>
$20 * MRR$	<i>Deposits</i>
<i>Other Assets</i>	<i>Other Debt</i>

- exemption** targeted aggregate liquidity
- not bank-specific

Exposed Reserves

$$ER_i = \frac{\text{SNB Reserves}_{i,12/2014} - \text{SNB Exemption}_i}{\text{Total Assets}_{i,12/2014}}$$

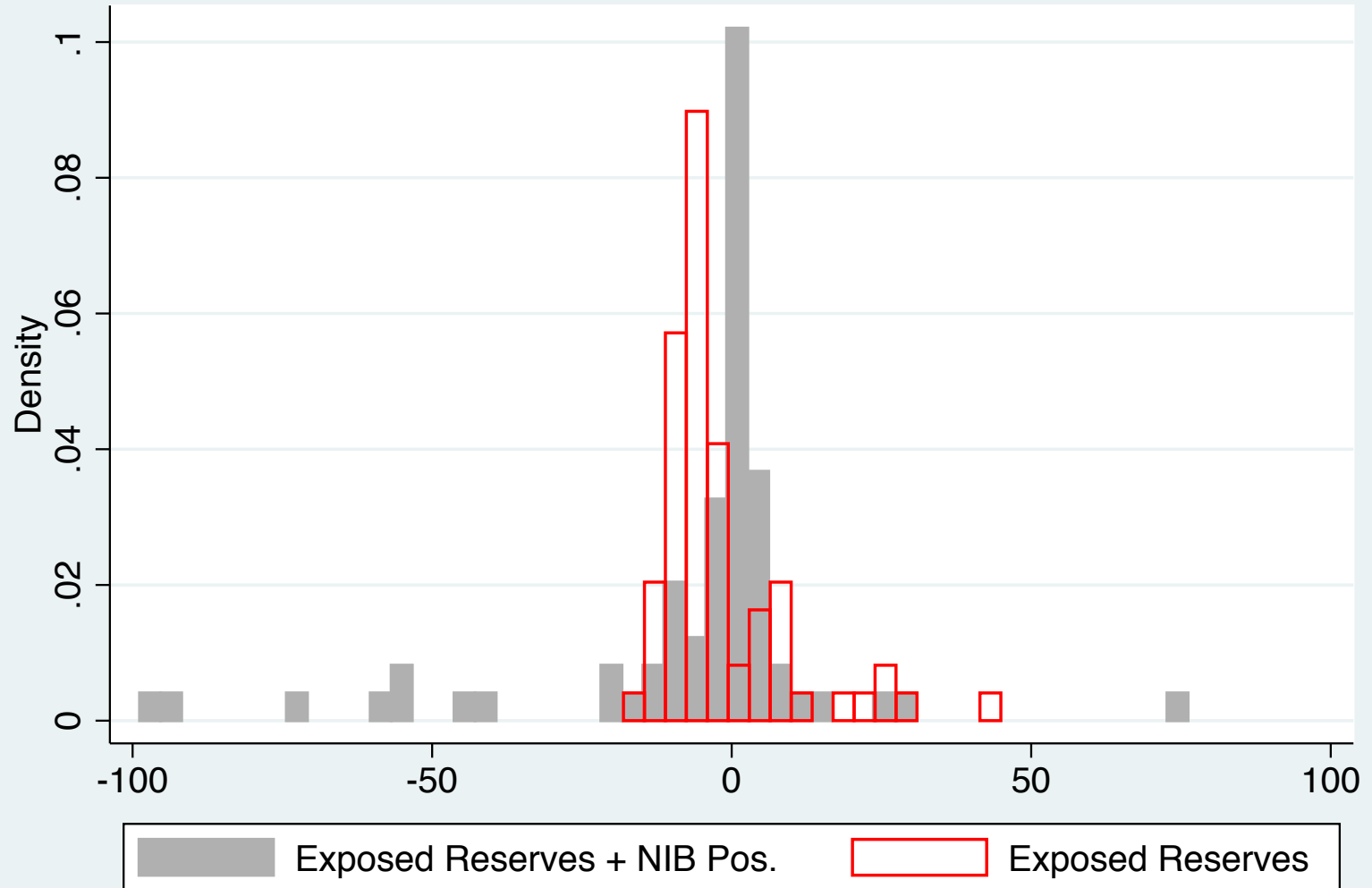
- treatment = ER
- ER > 0: neg. rates



Exposed Reserves in % of TA per 2014M12



Exposed Reserves in % of TA per 2014M12



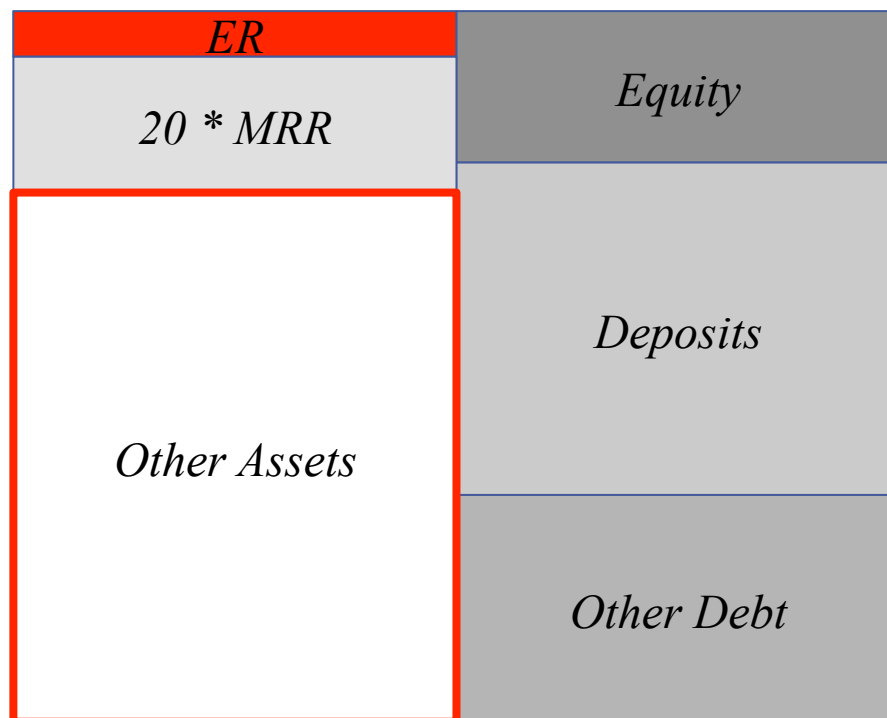
Transmission

- Initial Balance Sheet

<i>ER</i>	<i>Equity</i>
$20 * MRR$	<i>Deposits</i>
<i>Other Assets</i>	<i>Other Debt</i>

Transmission

- Balance Sheet Adjustment I:



- safe, short-term assets are relatively less attractive
- portfolio reallocation**: investment may shift to other assets

Transmission

- Initial Balance Sheet

<i>ER</i>	<i>Equity</i>
$20 * MRR$	<i>Deposits</i>
<i>Other Assets</i>	<i>Other Debt</i>

Transmission

- Balance Sheet Adjustment II:

<i>ER</i>	<i>Equity</i>
$20 * MRR$	<i>Deposits</i>
<i>Other Assets</i>	<i>Other Debt</i>

- reserve holdings are worth less
- leverage effect**: equity claim is reduced in value

Transmission

- Initial Balance Sheet

<i>ER</i>	<i>Equity</i>
$20 * MRR$	<i>Deposits</i>
<i>Other Assets</i>	<i>Other Debt</i>

Transmission

- Balance Sheet Adjustment III:

<i>ER</i>	
$20 * MRR$	<i>Equity</i>
<i>Other Assets</i>	<i>Deposits</i>
	<i>Other Debt</i>

- cost of debt decreases (provided pass-through is intact)
- franchise value effect:** equity claim is more valuable

Negative Rates

- ZLB on household deposits
 - lack of pass through eliminates franchise value effect & implies more risk-taking
 - identifying assumption in [Heider et al. \(2017\)](#)
- ineffective monetary policy if banks hoard cash
 - initial cash holdings are negligible
 - changes in cash holdings are subject to the negative rate (dynamic component)
- [Brunnermeier & Koby \(2017\)](#)
 - zero is not special, but a bank-specific reversal rate exists below which a rate cut becomes contractionary
 - 'reversal rate' increases in the capital requirement & cost of equity

Data

- **regulatory data**

- monthly balance sheets (July 2013 – June 2016)
- regulatory risk-measures (Q)
- income statements (H)

- all 250 banks in Switzerland for which

- (BS total + fiduciary business) \geq CHF 150 mio., and
- BS total \geq CHF 100 mio.

- we keep **70 retail banks** and drop ...

- wealth management banks
- cooperative banks (which are subject to a joint exemption threshold)
- universal banks (2)
- **trade-off**: (group homogeneity + external validity + identification) vs. N

Data

Sample composition

	Freq.	Percent
Raiffeisen banks	1	1.43
Other banks	5	7.14
Foreign controlled banks	12	17.14
Main branch of foreign bank	6	8.57
Cantonal banks	24	34.29
Regional banks	22	31.43
Total	70	100

Data

Exposed Reserves < P50

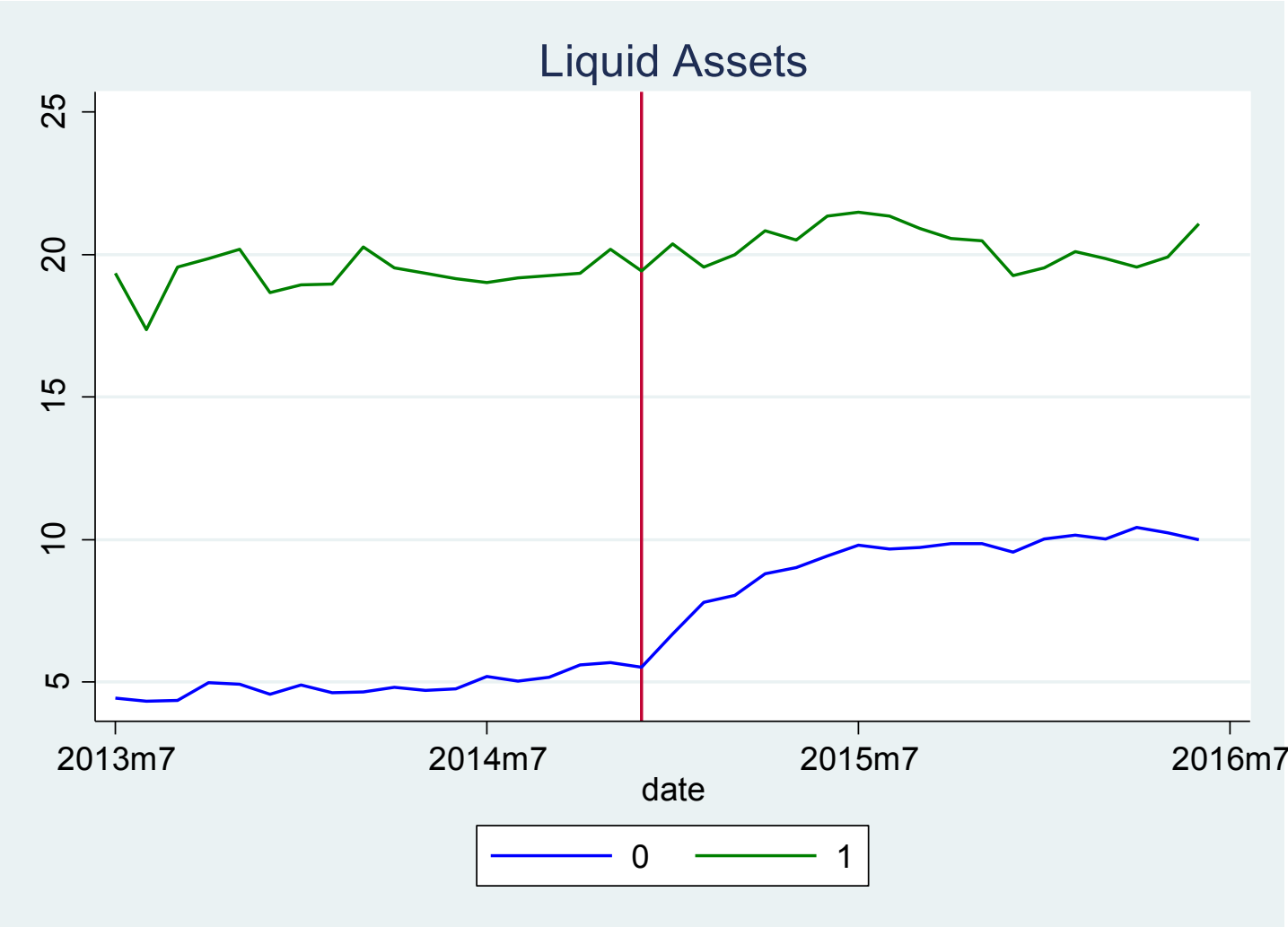
	ER<P50, Pre					ER<P50, Post					Diff
	Obs	Banks	Periods	Mean	SD	Obs	Banks	Periods	Mean	SD	
Exposed SNB Reserves/TA (per 2014m12)	1260	35	18	-8.33	2.58	-	-	-	-	-	-
Net Interbank Pos/TA (per 2014m12)	1260	35	18	-1.19	11.29	-	-	-	-	-	-
All SNB Reserves: % of TA	630	35	18	4.30	2.35	630	35	18	8.56	3.52	4.26***
Liquid Assets: % of TA	630	35	18	4.97	2.22	630	35	18	9.44	3.29	4.47***
Net Interbank Pos: % of TA	630	35	18	-1.20	11.32	630	35	18	-3.60	12.06	-2.41***
Loan Assets: % of TA	630	35	18	9.79	5.38	630	35	18	9.15	7.26	-0.64*
Mortgage Assets: % of TA	630	35	18	73.27	14.22	630	35	18	71.61	14.33	-1.65**
Fin. Assets: % of TA	630	35	18	5.79	5.41	630	35	18	4.99	4.02	-0.79***
Participations: % of TA	630	35	18	0.49	1.95	630	35	18	0.46	1.92	-0.03
Deposit Funding: % of TA	630	35	18	66.78	9.65	630	35	18	64.96	10.73	-1.83***
Bond Funding: % of TA	630	35	18	12.51	5.63	630	35	18	13.57	6.07	1.05***
Net Int Inc, % of TA	105	35	3	1.19	0.20	105	35	3	1.13	0.25	-0.06*
Loan Fees, % of TA	105	35	3	0.02	0.03	105	35	3	0.01	0.02	0
All Fees, % of BusVol	105	35	3	0.22	0.11	105	35	3	0.21	0.12	-0.01
FX Share, Liq Assets	630	35	18	6.69	11.79	630	35	18	1.39	1.68	-5.3***
FX Share, Total Assets	630	35	18	5.48	16.17	630	35	18	4.86	15.95	-0.62
FX Share, Total Liabilities	630	35	18	5.47	11.69	630	35	18	5.53	11.02	0.06
Risk Density	204	34	6	0.48	0.12	136	34	4	0.46	0.14	-0.01

Data

Exposed Reserves < P50

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Parallel trends: Liquid Assets/ TA



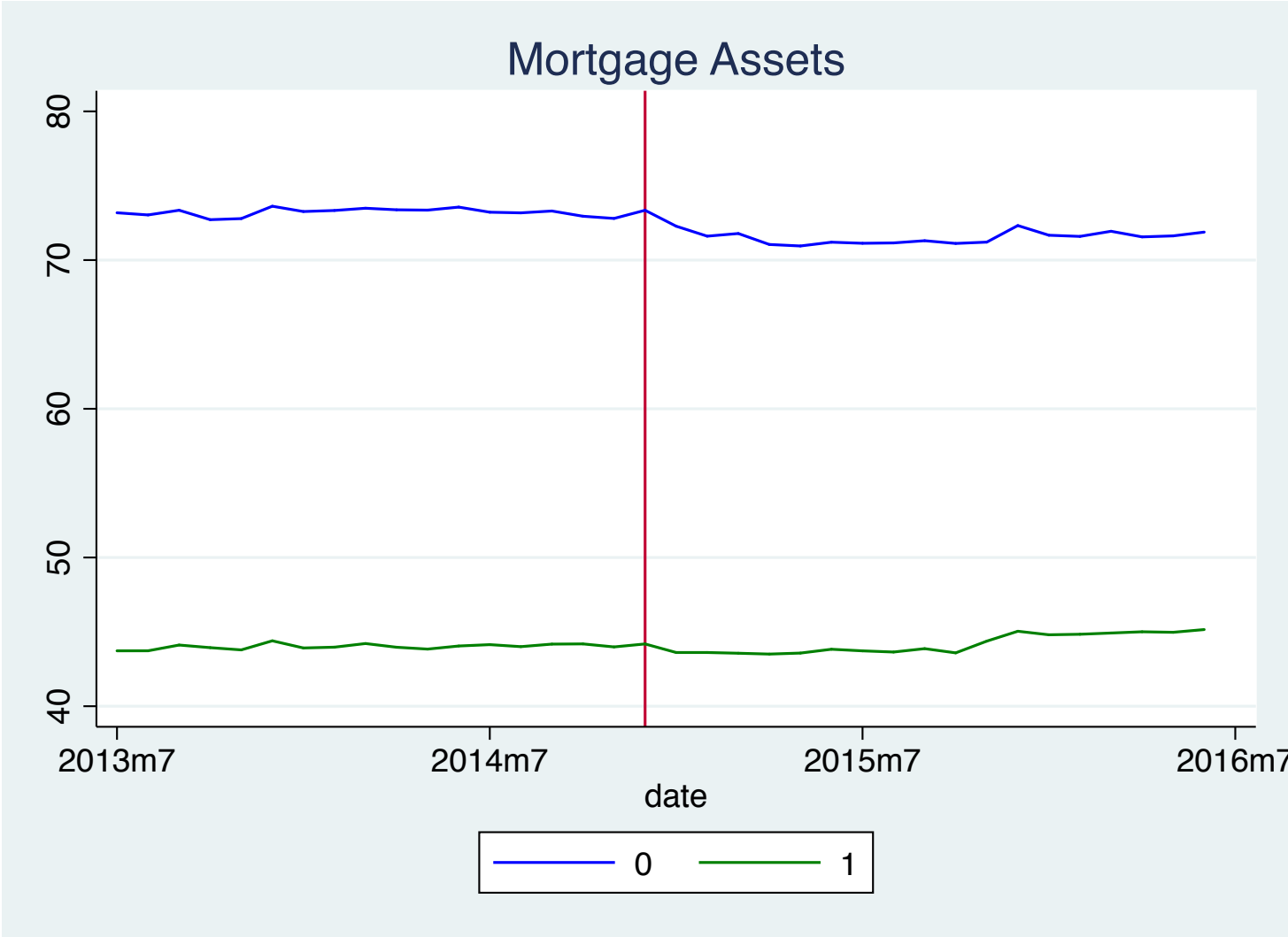
0: ER below median; 1: ER above median

Data

Exposed Reserves < P50

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Net Int Inc, % of TA	105	35	3	1.19	0.20	105	35	3	1.13	0.25	-0.06*
Loan Fees, % of TA	105	35	3	0.02	0.03	105	35	3	0.01	0.02	0
All Fees, % of BusVol	105	35	3	0.22	0.11	105	35	3	0.21	0.12	-0.01
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FX Share, Total Liabilities	630	35	18	5.47	11.69	630	35	18	5.53	11.02	0.06
Risk Density	204	34	6	0.48	0.12	136	34	4	0.46	0.14	-0.01

Parallel trends: Mortgages/ TA



0: ER below median; 1: ER above median

Data

Exposed Reserves \geq P50

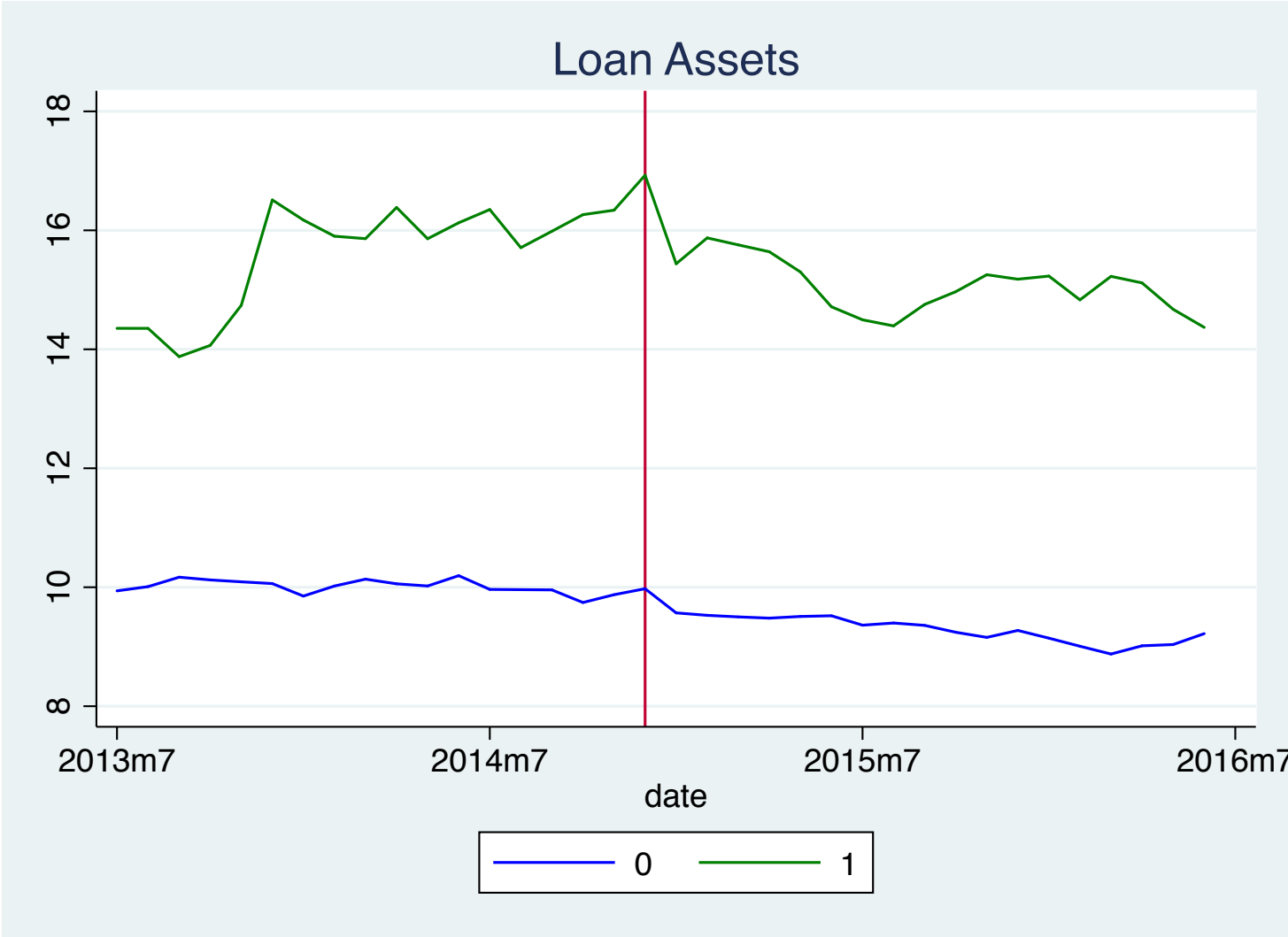
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Exposed SNB Reserves/TA (per 2014m12)	1260	35	18	4.84	11.76	-	-	-	-	-	-
Net Interbank Pos / TA (per 2014m12)	1260	35	18	-11.77	32.61	-	-	-	-	-	-
All SNB Reserves: % of TA	630	35	18	18.09	24.60	630	35	18	18.82	24.57	0.73
Liquid Assets: % of TA	630	35	18	18.80	24.31	630	35	18	19.67	24.29	0.88
Net Interbank Pos: % of TA	630	35	18	-7.87	29.65	630	35	18	-7.76	26.89	0.11
Loan Assets: % of TA	630	35	18	17.34	19.27	630	35	18	15.32	17.04	-2.02**
Mortgage Assets: % of TA	630	35	18	42.95	35.87	630	35	18	41.60	35.81	-1.35
Fin. Assets: % of TA	630	35	18	6.16	7.27	630	35	18	6.09	7.63	-0.07
Participations: % of TA	630	35	18	0.31	0.86	630	35	18	0.32	0.93	0.01
Deposit Funding: % of TA	630	35	18	52.06	24.78	630	35	18	53.37	46.42	1.31
Bond Funding: % of TA	630	35	18	6.94	7.03	630	35	18	7.29	7.92	0.35
Net Int Inc, % of TA	105	35	3	1.08	0.55	99	33	3	1.07	0.54	-0.02
Loan Fees, % of TA	105	35	3	0.17	0.32	99	33	3	0.16	0.29	-0.01
All Fees, % of BusVol	105	35	3	0.38	0.41	99	33	3	0.36	0.35	-0.02
FX Share, Liq Assets	630	35	18	4.34	14.36	611	35	17	4.54	16.20	0.2
FX Share, Total Assets	630	35	18	24.45	32.90	611	35	17	22.68	31.08	-1.76
FX Share, Total Liabilities	630	35	18	24.67	30.87	611	35	17	24.74	30.91	0.08
Risk Density	180	30	6	0.48	0.14	116	29	4	0.48	0.15	0.00

Data

Exposed Reserves \geq P50

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Loan Fees, % of TA	105	35	3	0.17	0.32	99	33	3	0.16	0.29	-0.01
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Risk Density	180	30	6	0.48	0.14	116	29	4	0.48	0.15	0.00

Parallel trends: Loans/ TA



0: ER below median; 1: ER above median

Empirical Model: Difference-in-Difference

$$Y_{i,t} = \alpha + \beta \cdot ER_i + \gamma \cdot Post_t + \delta \cdot (ER_i \times Post_t) + u_{i,t}$$

- increasing ER_i by 1 sd, raises $Y_{i,t}$ by $\delta \cdot 10.8$ pp
- identification
 - we argue that **exposure to neg. rates is exogenous**, and use heterogeneity in ER to estimate its causal effect
- robustness
 - alternative treatment variables (discrete, +NIB, Net Outflows, Dep)
 - bank & time FEs
 - alternative definitions of retail banks (income vs. business model)

Identification challenges

■ exogeneity

- announcement in Dec '14, correction in Jan '15
- **exemption threshold** set in view of aggregate liquidity
- graphic inspection of parallel trends
- “placebo” regressions

■ simultaneous termination of CHF-€ peg

- direct brokers who financed currency traders incurred most losses (*FT*, 2015)
- we **focus on retail banks**, which are less exposed to exchange rate risk

■ demand effects

- would need that retail banks with different ER face systematically different demand
- on-going: control for demand at the **mortgage-level** à la Basten & Koch (2015)

Results: Transmission to the Interbank Market

	(1)	(2)
	All SNB Reserves	Net Interbank Pos
Post*ER	-0.16*** (0.05)	0.08 (0.1)
Post	2.22*** (0.4)	-1.02 (0.93)
ER	1.41*** (0.23)	-0.42 (0.29)
Const.	13.65*** (1.54)	-5.26* (2.56)
Obs.	2,520	2,520
R2	0.6	0.04

- $ER \geq 0$: withdraw SNB reserves & increase net IB lending
- opposite if $ER < 0$

Results: Transmission to the Interbank Market

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Obs.	2,520	2,520
R2	0.6	0.04

1 sd increase
in ER, reduces
SNB Res/TA
by 1.73 pp

- $ER \geq 0$: **withdraw SNB reserves** & increase net IB lending
- opposite if $ER < 0$

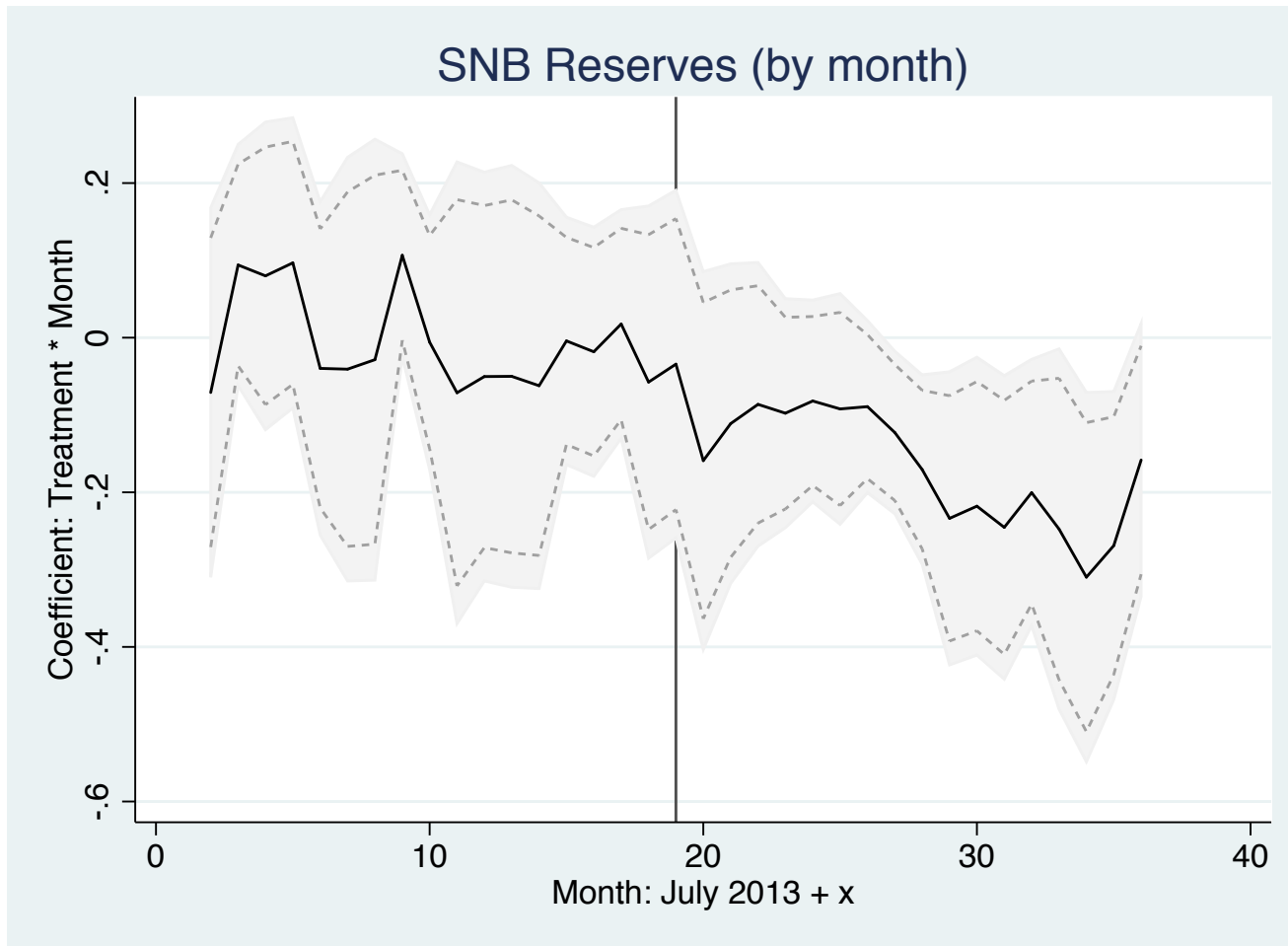
Results: Transmission to the Interbank Market

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Obs.	2,520	2,520
R2	0.6	0.04

1 sd increase
in ER,
increases the
NIB pos/TA
by 0.86 pp

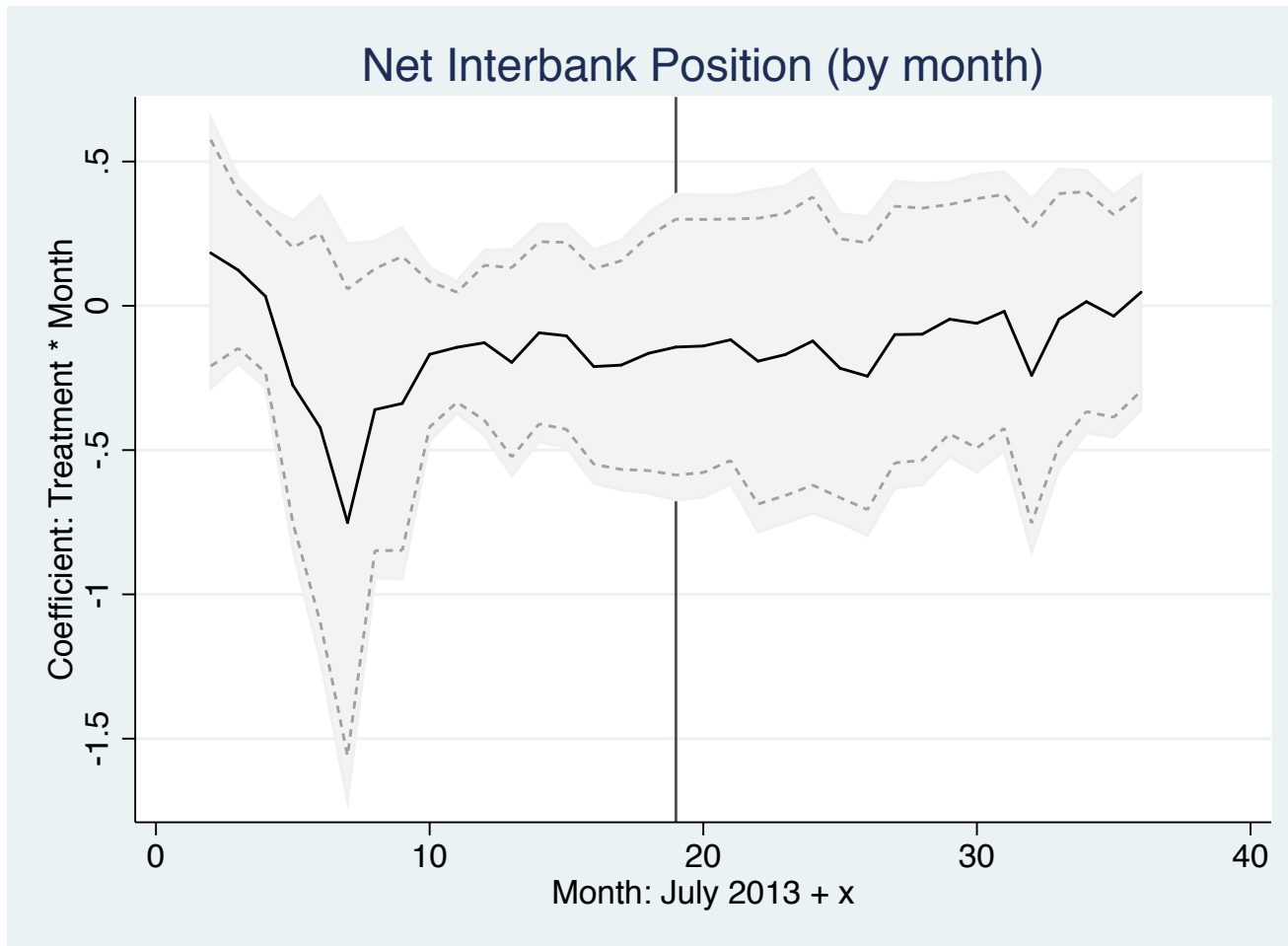
- effect on interbank lending not robust across specifications
- limited economic significance

Results: SNB Reserves



- Pre: 2013m7; Post: 2013m8, 2013m9, ..., 2016m6
- effect on SNB reserves is visible but **sluggish**

Results: Net Interbank Position



- Pre: 2013m7; Post: 2013m8, 2013m9, ..., 2016m6
- retail banks do not seem to drive IB transmission

Results: Balance Sheet Restructuring

	(1)	(2)	(3)
	Loans	Mortgages	Financial Assets
Post*ER	0.04 (0.04)	0.08*** (0.02)	0.05** (0.02)
Post	-1.27 (0.80)	-1.36* (0.77)	-0.35 (0.23)
ER	0.28 (0.19)	-2.13*** (0.25)	0.05 (0.10)
Const.	14.05*** (1.88)	54.41*** (2.71)	6.06*** (0.86)
Obs.	2,520	2,520	2,520
R2	0.05	0.52	0.02

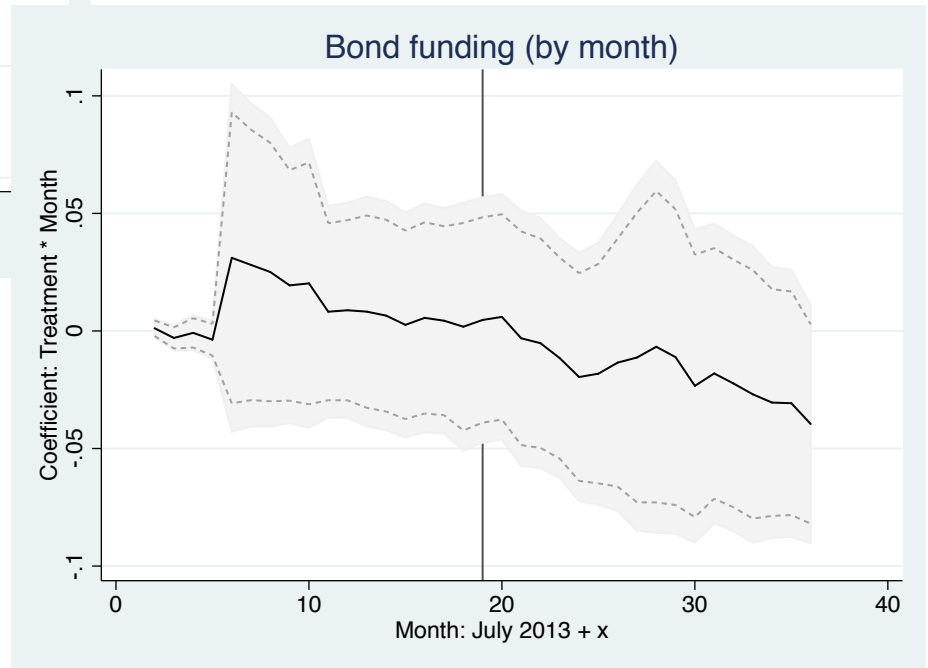
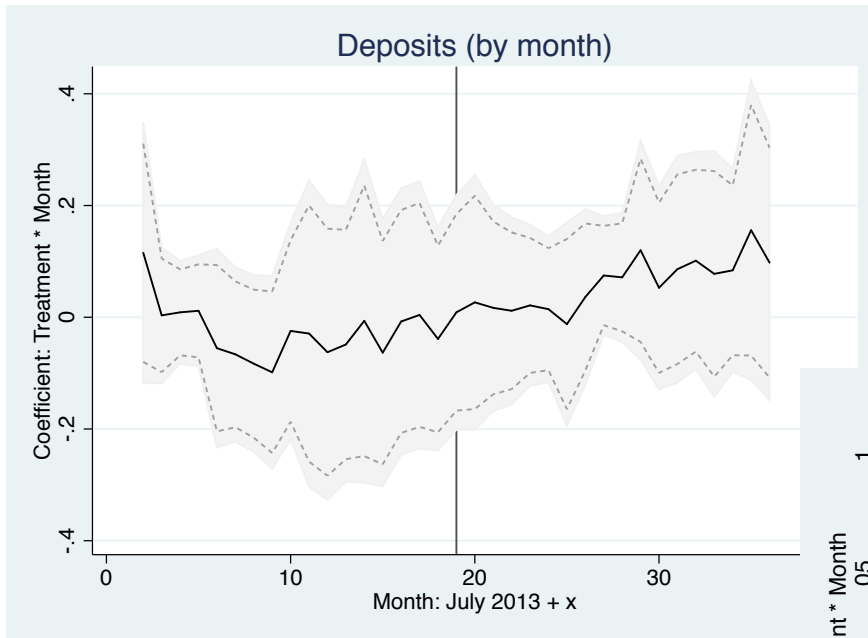
- monetary policy is **expansionary, especially wrt. mortgages**
- effect on **investment in financial assets** less robust
- risk-taking?

Results: Balance Sheet Restructuring

	(1)	(2)	(3)	(4)	(5)
	Loans	Mortgages	Financial Assets	Deposit Funding	Bond Funding
Post*ER	0.04 (0.04)	0.08*** (0.02)	0.05** (0.02)	0.07* (0.04)	-0.03** (0.01)
Post	-1.27 (0.80)	-1.36* (0.77)	-0.35 (0.23)	-0.13 (0.76)	0.66*** (0.15)
ER	0.28 (0.19)	-2.13*** (0.25)	0.05 (0.10)	-1.07*** (0.20)	-0.36*** -0.06
Const.	14.05*** (1.88)	54.41*** (2.71)	6.06*** (0.86)	57.56*** (2.06)	9.11*** (0.68)
Obs.	2,520	2,520	2,520	2,520	2,520
R2	0.05	0.52	0.02	0.16	0.30

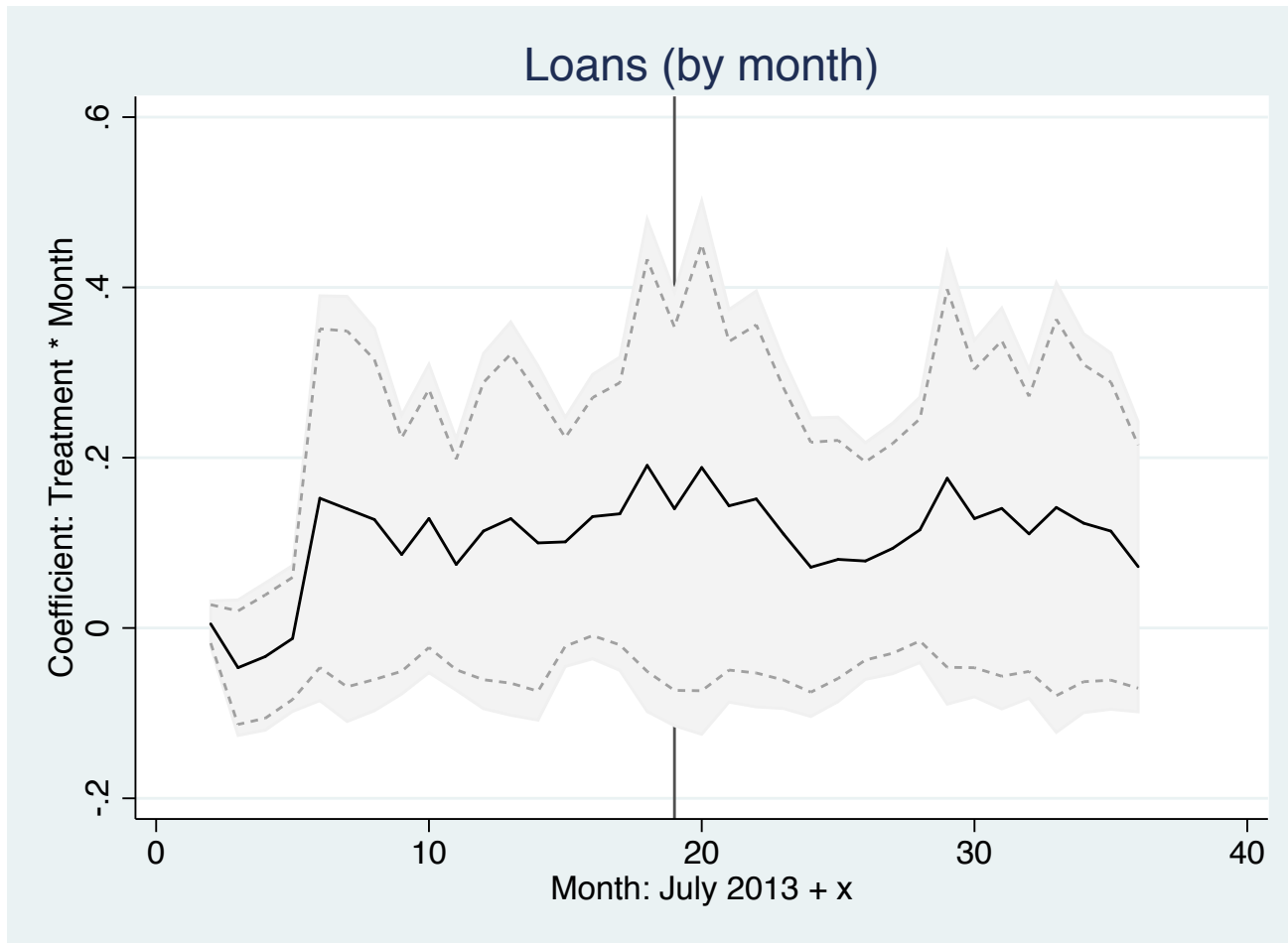
- avg. bond financing increases (consistent w/ pass through)
- treated banks issue fewer bonds & take more deposits

Results: Deposit and Bond Funding



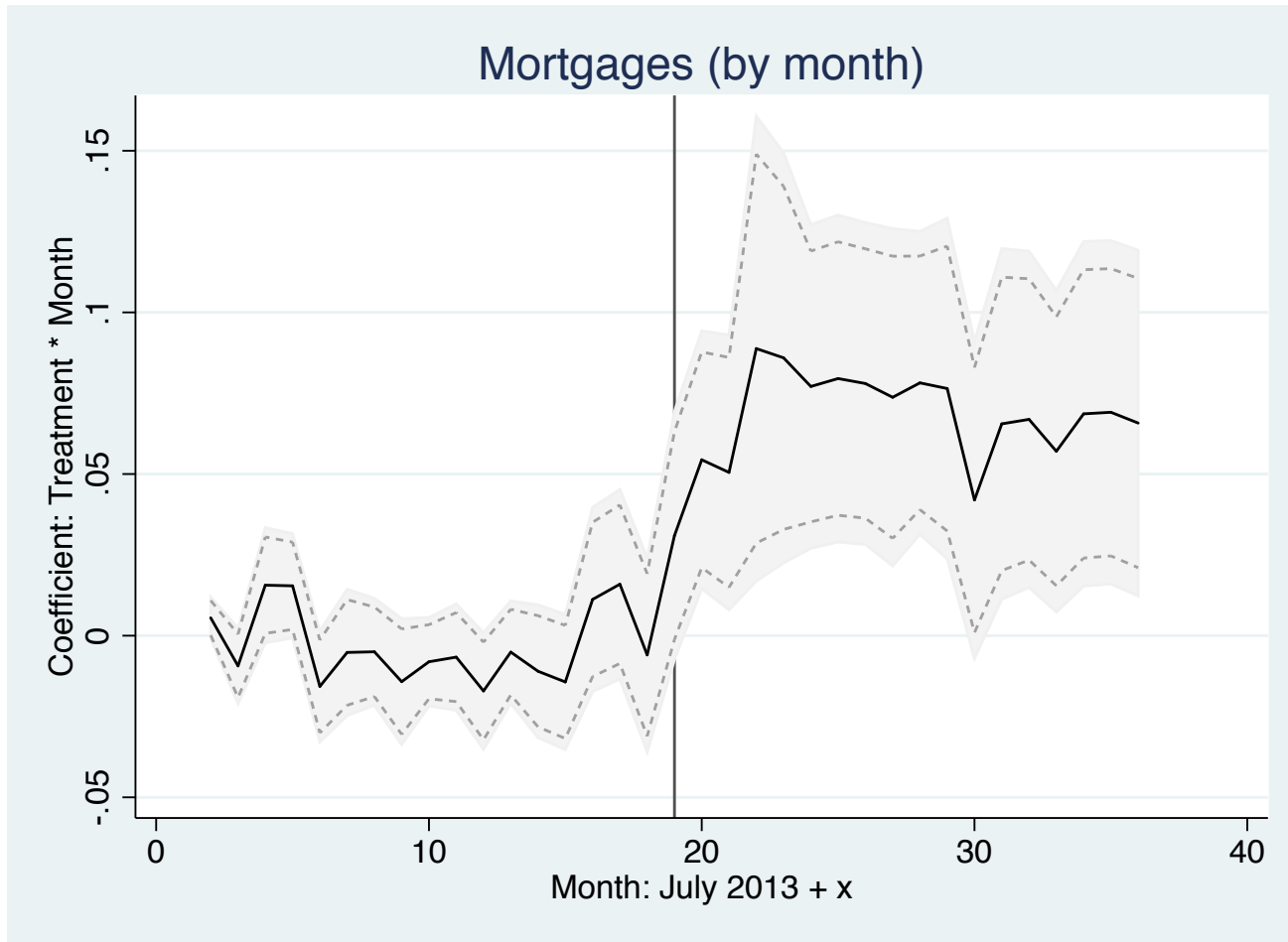
- Pre: 2013m7; Post: 2013m8, 2013m9, ..., 2016m6

Results: Loans



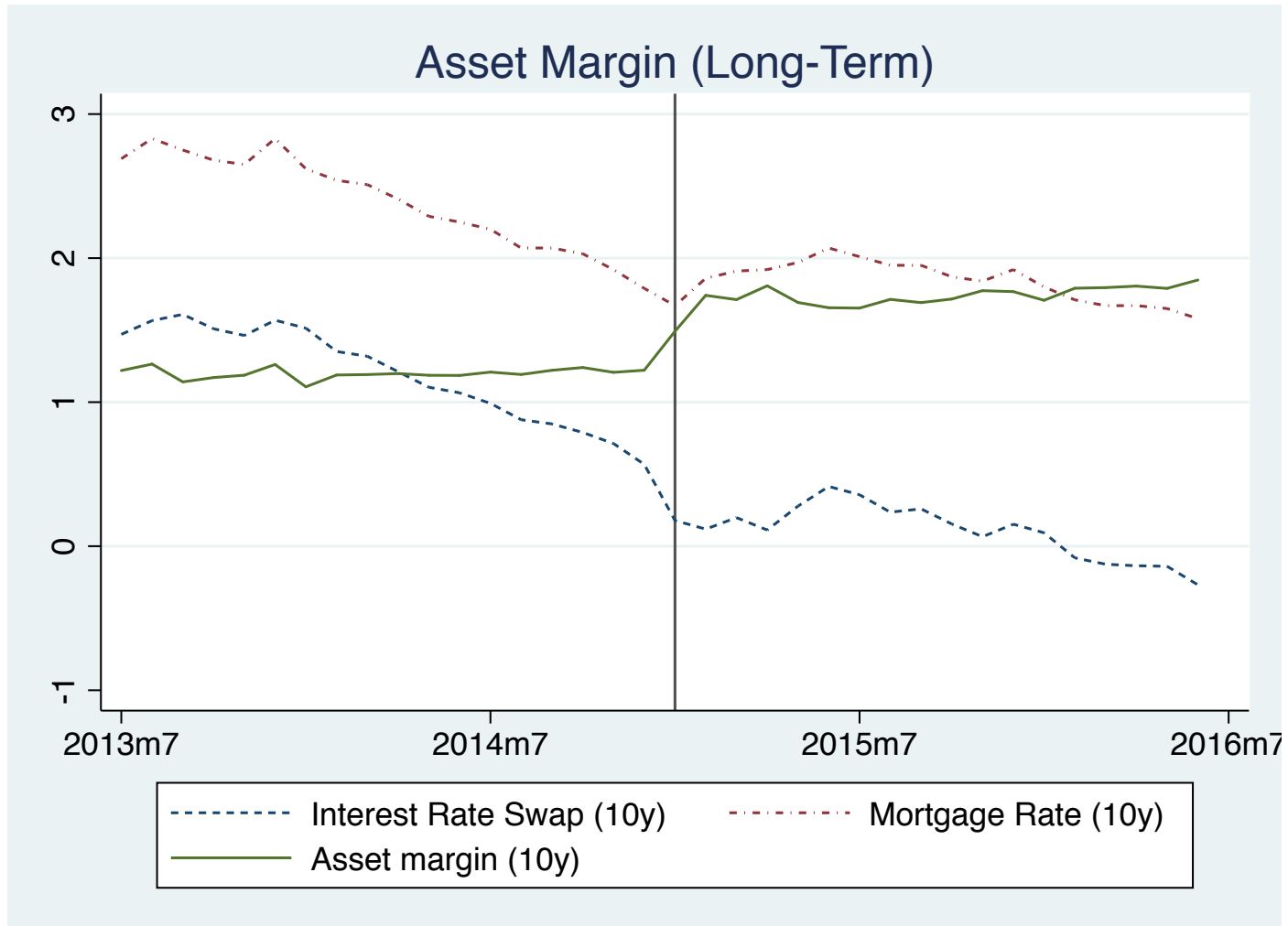
- Pre: 2013m7; Post: 2013m8, 2013m9, ..., 2016m6
- no detectable effect on corporate lending

Results: Mortgages



- Pre: 2013m7; Post: 2013m8, 2013m9, ..., 2016m6
- relative expansion of mortgage lending post-treatment

Results: Mortgages



- simultaneous **increase in mortgage rates**
- rates decreased from July 2015, but margin remained high

Results: Mortgages

Explanations

- demand
- risk-taking
- collusion
- ?

Results: Mortgages

Explanations

- demand
 - *would need to increase more for banks with higher excess reserves*
- risk-taking
- collusion
- ?

Results: Mortgages

Explanations

- demand
- risk-taking
 - *plausible, and some indicative evidence in the mortgage-specific bank-level information we have*
- collusion
- ?

Results: Mortgages

Explanations

- demand
- risk-taking
- collusion
 - *some narrative evidence in the press, but we do not observe differences for more/less competitive markets*
- ?

Results: Mortgages

Explanations

- demand
- risk-taking
- collusion
- ?

Results: Foreign Currency Assets & Liabilities

	% FX Assets				% FX Liab.		% Tot Assets	
	(1) Liquid Assets	(2) Claims on Banks	(3) Securities	(4) Financial Assets	(5) Due to Banks	(6) Dep.	(7) FX Assets	(8) FX Liab.
Post*ER	0.24** (0.10)	-0.13 (0.10)	0.53 (0.41)	-0.03 (0.09)	0.09 (0.10)	0.07* (0.04)	0.03 (0.04)	0.06 (0.04)
Post	-2.25*** (0.84)	1.64 (1.83)	4.26 (3.43)	0.47 (0.80)	-2.74 (1.84)	0.30 (0.26)	-0.65* (0.33)	0.53 (0.33)
ER	-0.24** (0.10)	0.48 (0.50)	0.82 (0.57)	1.38*** (0.42)	0.60 (0.49)	1.18 (0.84)	0.94** (0.38)	0.97** (0.40)
Const.	5.23*** (1.49)	56.48*** (3.80)	40.46*** (5.35)	18.36*** (3.70)	34.49*** (4.65)	11.26* (6.55)	15.60*** (3.28)	15.91*** (3.07)
Obs.	2,448	2,448	1,842	1,770	1,659	1,568	2,448	2,448
R2	0.03	0.02	0.04	0.20	0.04	0.12	0.16	0.20

- more investment in FX liquid assets, but matched with an increase in FX deposits
- Can FX hedging explain increase in deposit taking?

Results: Foreign Currency Assets & Liabilities

	% FX Assets				% FX Liab.		% Tot Assets	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Liquid Assets	Claims on Banks	Securities	Financial Assets	Due to Banks	Dep.	FX Assets	FX Liab.
Post*ER	0.24** (0.10)	-0.13 (0.10)	0.53 (0.41)	-0.03 (0.09)	0.09 (0.10)	0.07* (0.04)	0.03 (0.04)	0.06 (0.04)
Post	-2.25*** (0.84)	1.64 (1.83)	4.26 (3.43)	0.47 (0.80)	-2.74 (1.84)	0.30 (0.26)	-0.65* (0.33)	0.53 (0.33)
ER	-0.24** (0.10)	0.48 (0.50)	0.82 (0.57)	1.38*** (0.42)	0.60 (0.49)	1.18 (0.84)	0.94** (0.38)	0.97** (0.40)
Const.	5.23*** (1.49)	56.48*** (3.80)	40.46*** (5.35)	18.36*** (3.70)	34.49*** (4.65)	11.26* (6.55)	15.60*** (3.28)	15.91*** (3.07)
Obs.	2,448	2,448	1,842	1,770	1,659	1,568	2,448	2,448
R2	0.03	0.02	0.04	0.20	0.04	0.12	0.16	0.20

- no differential effect on total shares of FX assets & liabilities
- suggests that negative rate effect dominates the exchange rate effect (in our sample)

Results: Deposit Ratio (2014m12)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All SNB Reserves	NIB Pos	Loans	Mortgages	Financial Assets	Deposit Funding	Bond Funding
Post*DR	0.01 (0.03)	-0.12 (0.13)	0.14 (0.12)	-0.01 (0.03)	0.00 (0.02)	-0.02 (0.03)	0.01 (0.01)
Post	2.26** (1.10)	2.27 (4.60)	-5.32 (4.25)	-1.31 (1.16)	-0.47 (0.36)	0.37 (1.34)	0.38 (0.29)
DR	-0.65** (0.29)	1.05*** (0.23)	-0.47** (0.20)	1.12*** (0.29)	0.07 (0.05)	1.27*** (0.16)	0.16** (0.07)
Const.	30.29*** (10.21)	-35.26*** (7.15)	27.30*** (6.99)	25.41** (9.78)	3.90*** (1.37)	22.28*** (5.24)	5.03** (2.10)
Obs.	2,520	2,520	2,520	2,520	2,520	2,520	2,520
R2	0.19	0.31	0.13	0.19	0.02	0.30	0.08

- no significant effect from having a high deposit ratio
- coefficients are inverted

Results: Deposit Ratio (2014m12)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All SNB Reserves	NIB Pos	Loans	Mortgages	Financial Assets	Deposit Funding	Bond Funding
Post*ER*DR	-0.01*** (0.00)	0.00 (0.01)	-0.00 (0.00)	-0.00 (0.00)	0.00* (0.00)	0.00 (0.00)	-0.00 (0.00)
Post*ER	-0.04 (0.04)	-0.03 (0.20)	0.17 (0.11)	0.11** (0.05)	0.01 (0.02)	0.05 (0.05)	-0.01 (0.01)
Post*DR	-0.07* (0.04)	-0.10 (0.15)	0.18 (0.14)	0.03 (0.03)	0.03 (0.02)	0.01 (0.04)	0.00 (0.01)
ER*DR	-0.04*** (0.01)	0.03 (0.02)	0.02 (0.01)	-0.03** (0.01)	0.01** (0.01)	0.02** (0.01)	-0.01 (0.00)
ER	1.94*** (0.16)	-0.33 (0.47)	-0.21 (0.29)	-1.37*** (0.28)	-0.12** (0.05)	-0.89*** (0.24)	-0.22* (0.11)
DR	-0.19* (0.11)	1.13*** (0.27)	-0.43** (0.21)	0.35 (0.26)	0.13** (0.06)	1.09*** (0.18)	0.02 (0.08)
Post	3.61*** (1.27)	2.21 (5.01)	-6.58 (4.76)	-2.24* (1.31)	-0.86** (0.38)	-0.25 (1.42)	0.56 (0.35)
Const.	16.38*** (4.04)	-35.18*** (7.82)	27.45*** (7.05)	41.79*** (8.51)	3.51** (1.40)	28.22*** (5.82)	7.87*** (2.62)
Obs.	2,520	2,520	2,520	2,520	2,520	2,520	2,520
R2	0.73	0.36	0.16	0.57	0.21	0.35	0.33

Results: Deposit Ratio (2014m12)

Deposit Ratio and ER are negatively correlated

- a higher deposit ratio increases exposure to negative rates if pass through is limited for deposits (Heider et al., 2017)
- but: more deposits imply higher reserve requirements & therefore a higher exemption threshold
- also: the adverse effect on NII is compensated by increasing asset margins

Results: Brunnermeier & Koby (2017)

X =	CET1/TA		CET1/RWA		CET1/RWA - Req.		Req.	
	(1) Loans	(2) Mortgages	(3) Loans	(4) Mortgages	(5) Loans	(6) Mortgages	(7) Loans	(8) Mortgages
Post*ER*X	0.31 (0.63)	1.09 (0.97)	0.26 (0.32)	0.22 (0.48)	0.22 (0.31)	0.44 (0.45)	-22.36 (25.40)	-3.35 (24.17)
Post*ER	-11.19 (16.44)	-15.40 (17.23)	-10.80 (15.56)	-11.66 (17.27)	-8.66 (13.58)	-11.97 (14.20)	159.04 (178.72)	22.82 (171.26)
Post*X	15.33* (8.76)	-34.51* (19.98)	1.90 (2.81)	-8.27 (6.72)	2.69 (2.73)	-12.20* (6.59)	-364.00* (197.07)	1,304.15*** (236.45)
ER*X	-1.01 (3.71)	23.78 (17.43)	-1.21 (1.92)	-1.01 (9.42)	-0.60 (1.81)	2.74 (8.35)	207.97** (93.11)	408.26 (558.64)
Post	-254.15 (158.54)	663.64*** (245.02)	-148.51 (120.53)	510.57*** (170.92)	-142.08 (107.28)	484.33*** (139.25)	2,576.22* (1,383.49)	-9,242.28*** (1,689.14)
ER	82.62 (93.99)	-183.64 (374.76)	84.06 (88.40)	-3.31 (368.09)	70.58 (75.34)	-42.57 (306.39)	-1,456.32** (653.02)	-2,903.70 (3,954.75)
X	-126.18** (61.49)	-826.12** (363.57)	-29.08 (17.73)	-109.15 (120.27)	-40.94** (17.42)	-179.33 (112.58)	4,689.40*** (759.01)	25,175.87*** (5,357.95)
Obs.	2,304	2,304	2,304	2,304	2,304	2,304	2,520	2,520
R2	0.08	0.07	0.06	0.02	0.06	0.03	0.54	0.69

- no significant role of capital/ capital requirements
- better capitalization & lower cap req. ⇔ expansionary MP

Results: Liquidity Coverage Ratio

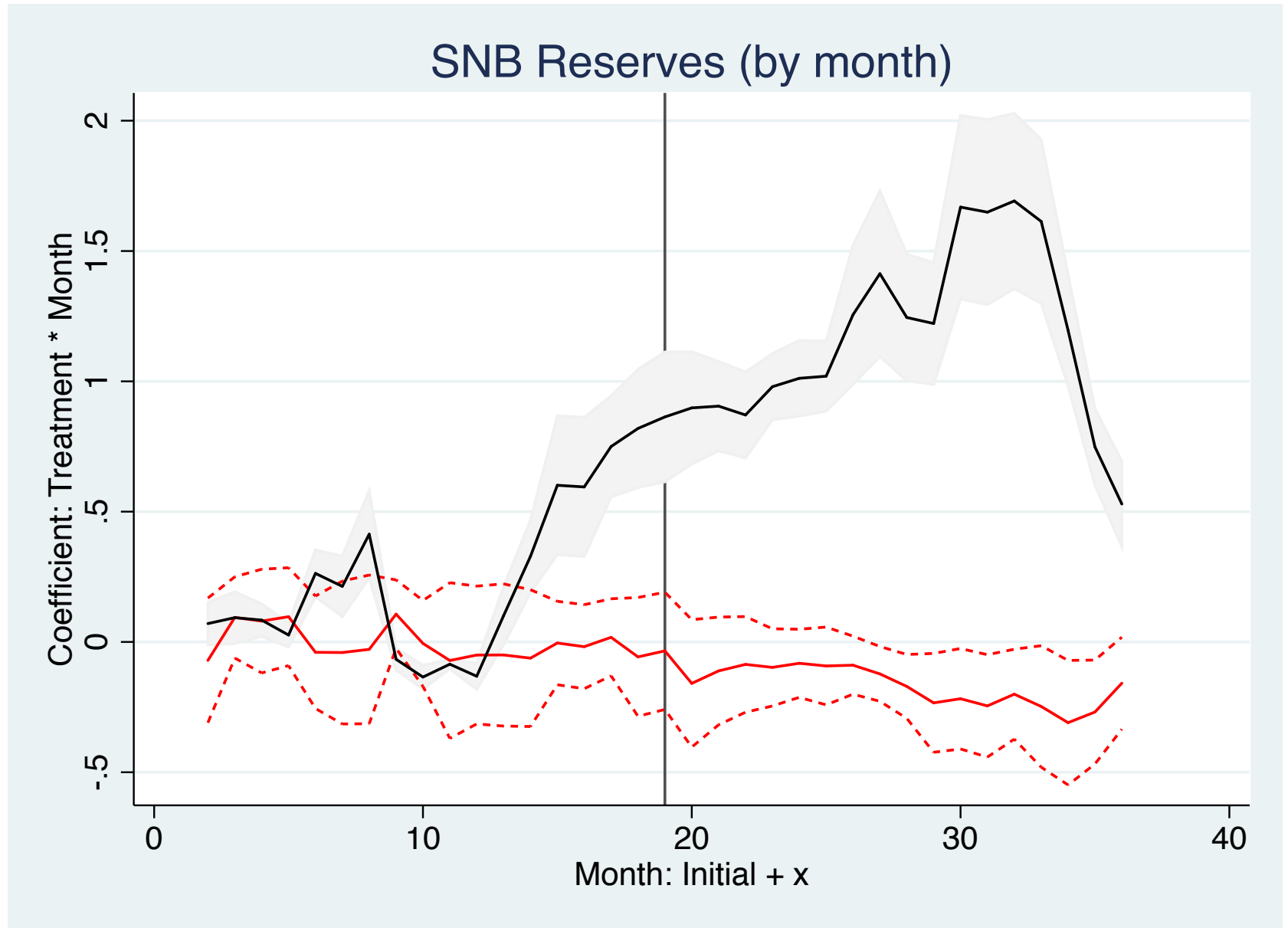
- banks must hold HQLA to cover net outflows (NO)
 - on avg. 84% of HQLA = SNB Reserves
 - phase in to 100% by 2019
 - requirement in 2016: 60%
- Alternative treatment: $60\% * NO$ – Neg. Rate Exemption

Results: Liquidity Coverage Ratio

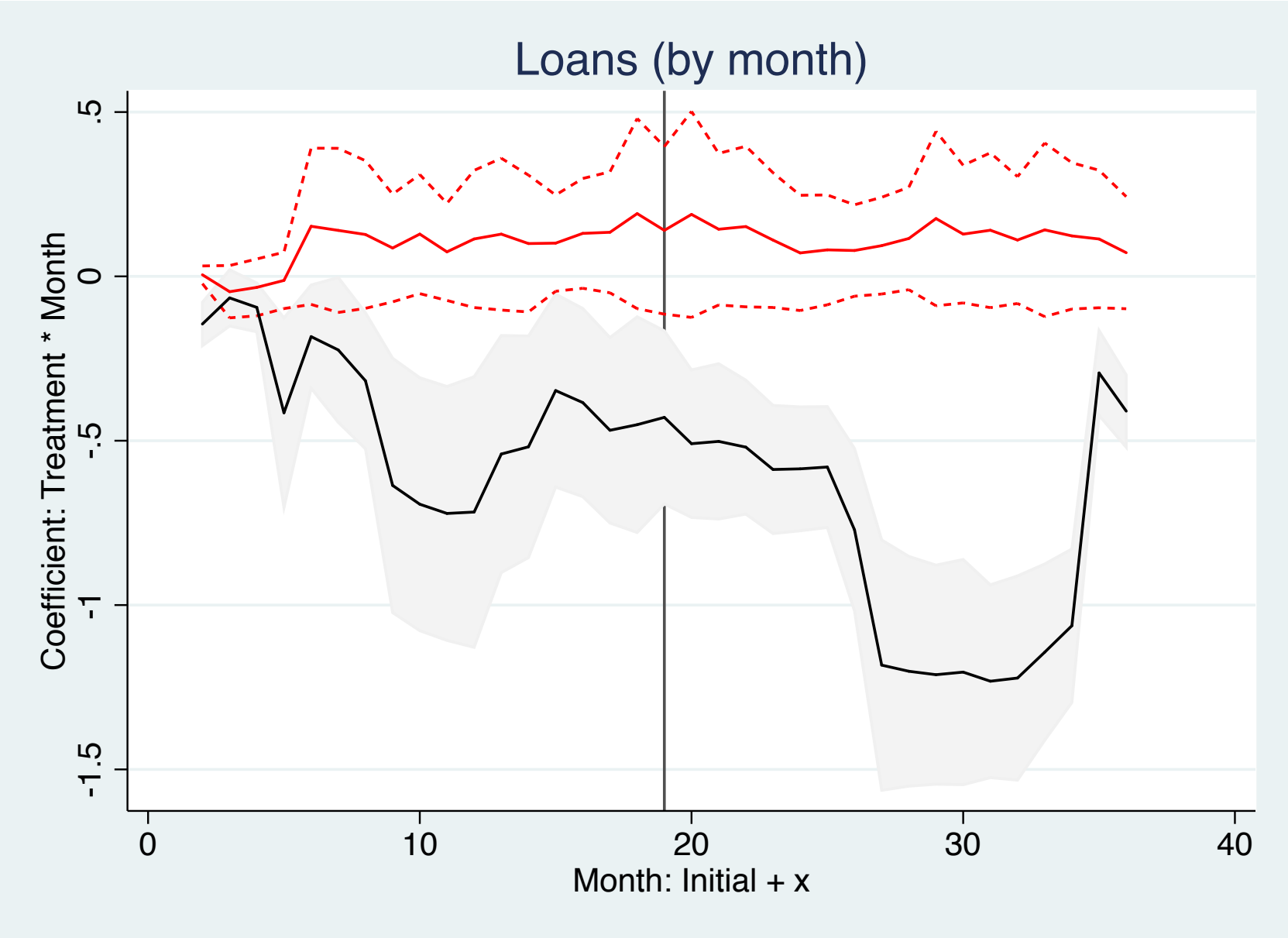
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Liquid Assets	NIB Pos	Loans	Mortgages	Financial Assets	Deposit Funding	Bond Funding	LCR
Post*NO	-2.22* (1.25)	0.62 (1.74)	1.29 (1.56)	1.60*** (0.47)	0.33 (0.92)	1.95* (1.03)	-0.42 (0.64)	-45.99** (18.20)
Post	3.18*** (0.43)	-1.61*** (0.34)	-0.98*** (0.15)	-1.14*** (0.29)	-0.47*** (0.12)	-1.15*** (0.41)	0.62* (0.35)	31.92*** (11.81)
NO	18.21** (6.97)	-6.93 (8.16)	16.85*** (4.49)	-58.98*** (6.82)	6.35** (2.91)	-22.66*** (5.94)	-5.62** (2.40)	44.78* (25.86)
Const.	6.55*** (0.50)	-1.41 (1.39)	8.67*** (0.63)	74.57*** (1.28)	4.83*** (0.40)	67.24*** (1.38)	12.89*** (0.76)	122.61*** (10.98)
Obs.	2,376	2,340	2,376	2,376	2,304	2,340	1,993	1,443
R2	0.21	0.02	0.35	0.72	0.19	0.30	0.12	0.01

- results are consistent with ER treatment
- conflict between monetary policy & financial stability

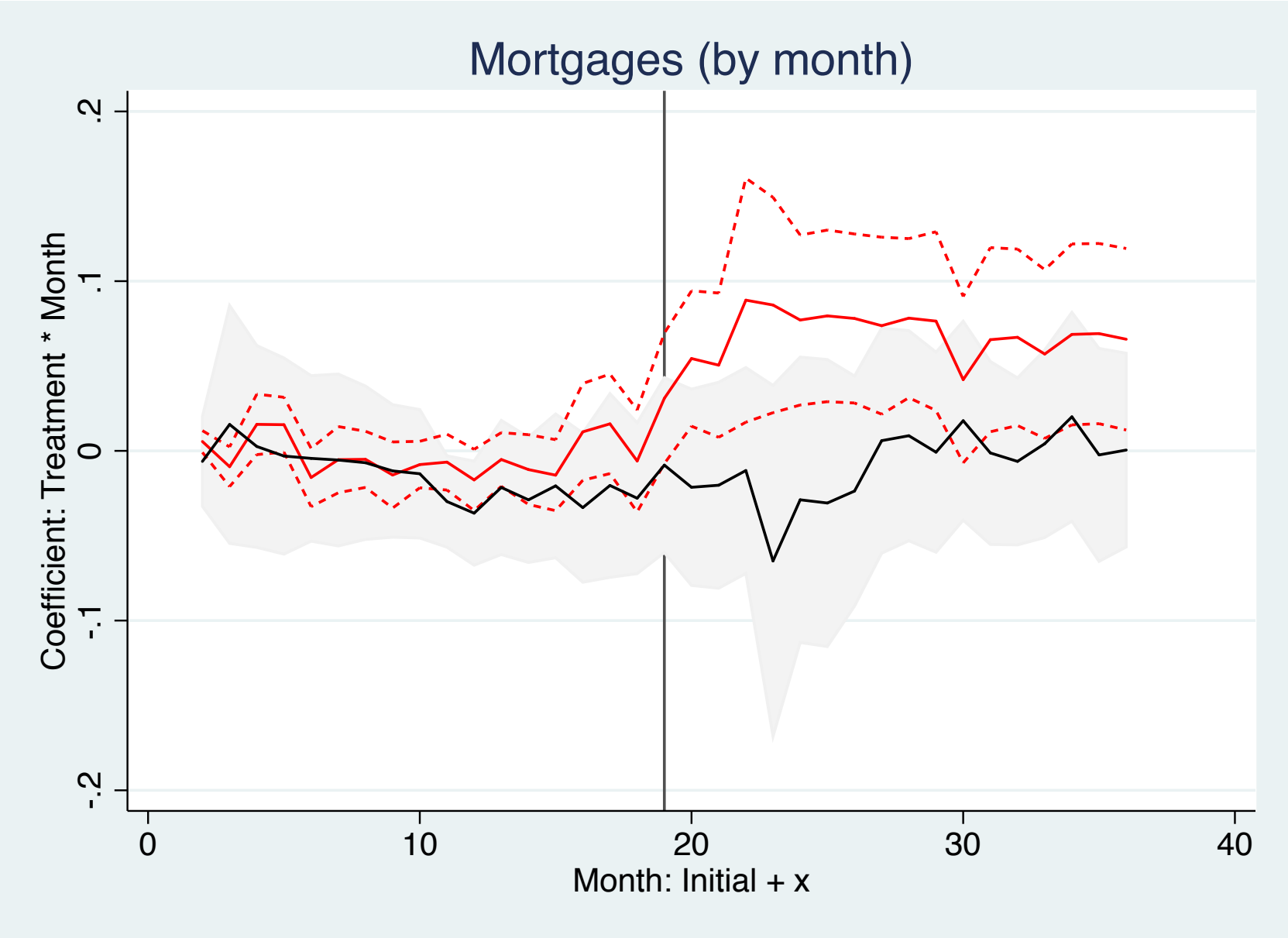
Results: Positive Rate Reduction (2011m8)



Results: Positive Rate Reduction (2011m8)



Results: Positive Rate Reduction (2011m8)



Conclusion

Banks exposed to negative policy rates:

- withdraw SNB reserves and lend more to other banks
- move into FX Liquid Assets, but keep FX exposure const.
- expand mortgage lending, but not lending to corporates
- are not necessarily hurt by a high deposit ratio
- compensate squeezed NII via mortgage lending (and fees)
- take more risks (unreported, TBC for current sample)

Conclusion

- **transmission** to the interbank market as intended
- most pronounced effect: **mortgage lending**
 - possibly consistent with increased risk-taking
 - only temporary compensation for squeezed NII
- some evidence that **ZLB may be soft** due to fees
- some evidence consistent with the idea of a 'reversal rate'
- potential conflict with LCR phase-in

Thank you!