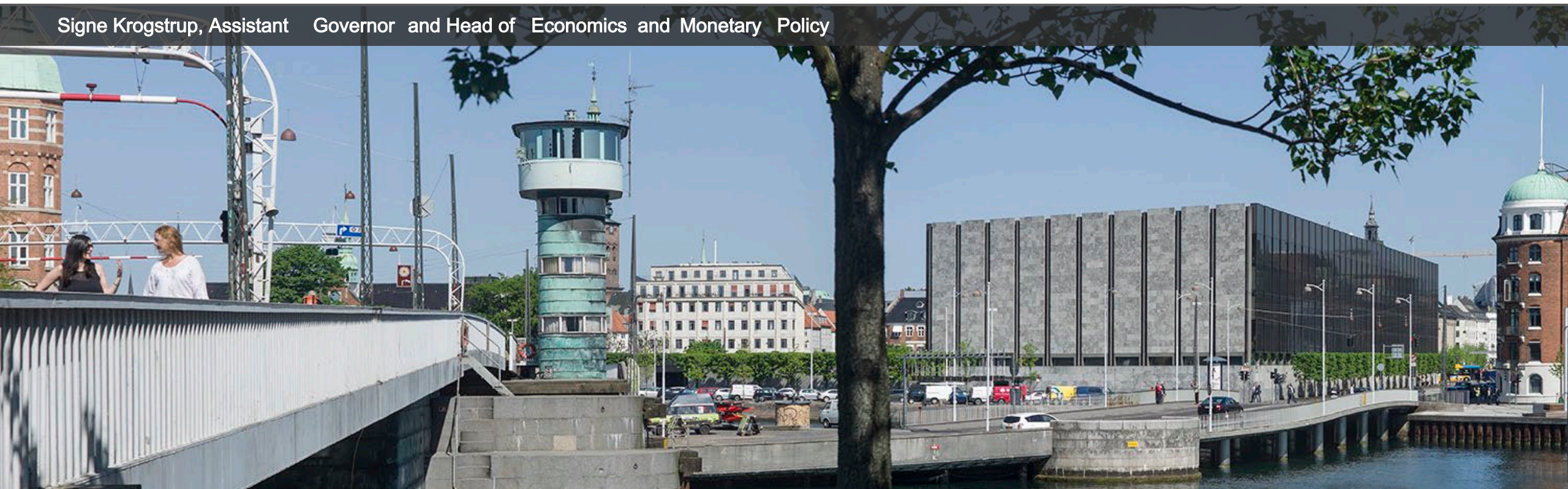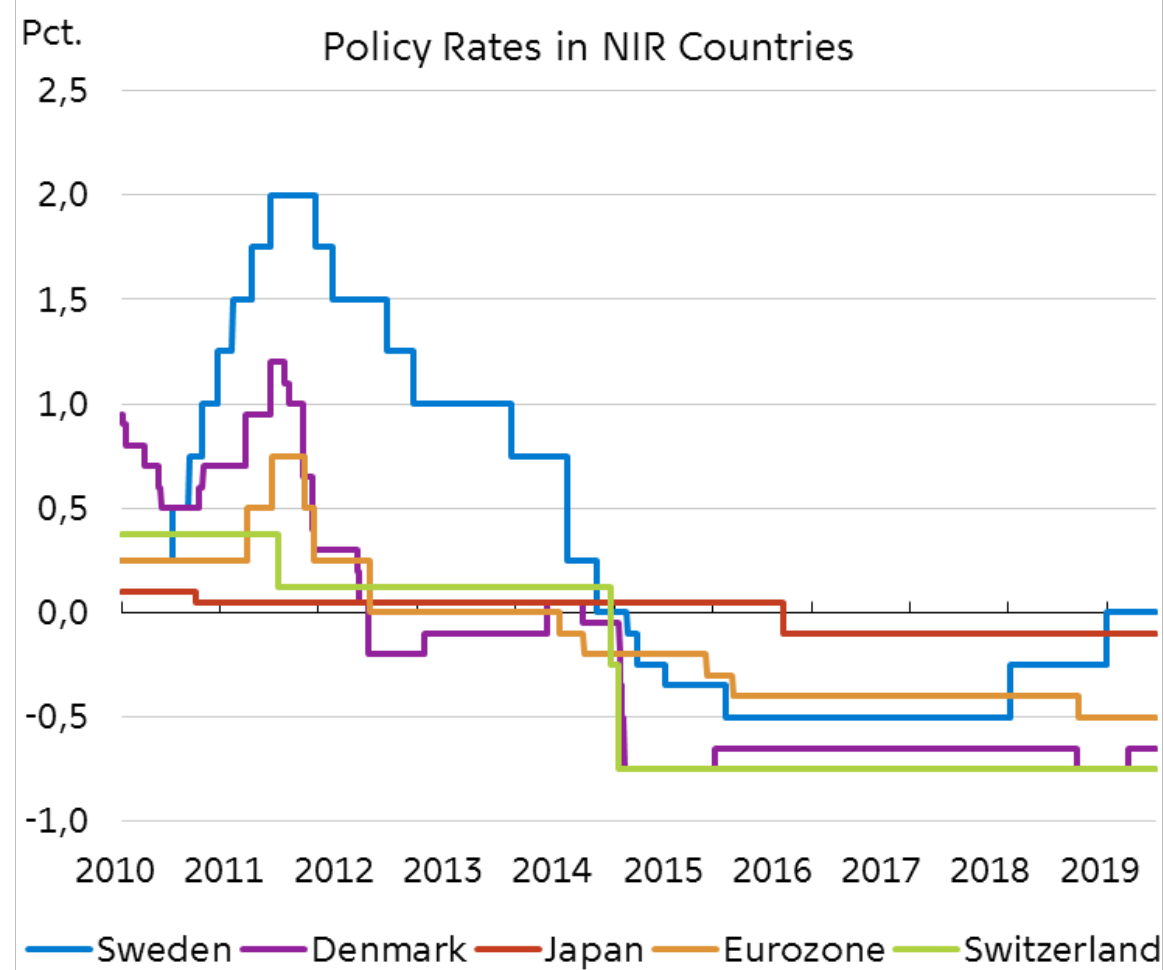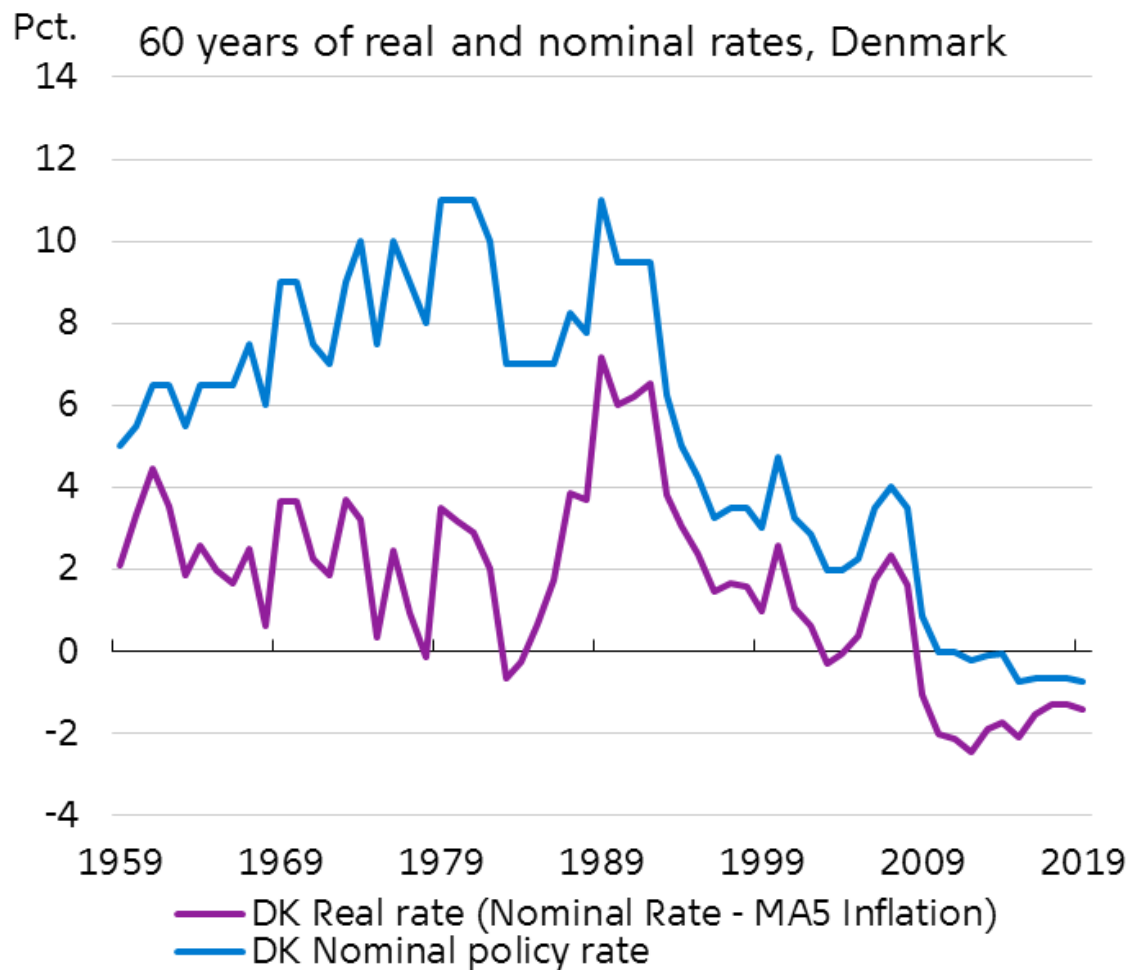# DANMARKS NATIONALBANK

DISCUSSION OF 'IS THERE A ZERO LOWER BOUND? THE EFFECTS OF NEGATIVE POLICY RATES ON BANKS AND FIRMS'

Signe Krogstrup, Assistant   Governor and Head of   Economics and Monetary   Policy

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Context: Low neutral real interest rates, inflation and the ELB

Sources: Thomson Reuters Datastream, IFS, Danmarks Nationalbank.

Context: Can NIRP provide additional accommodation at ELB?

- Are NIRP a useful tool? How has it performed? Can we go further?

- Bank deposits and ZLB ?

- Bank lending channel
    - Evidence NIRP has been effective: Adolfsen and Spange 2020,   Bottero et al. 2019 Eisenschmidt and Smets 2018, Demiralp et al. 2019
    - Concerns about "reversal" of transmission due to ZLB on deposits (Eggertsson et al, 2019, Brunnermeier and Koby, 2017, Heider et al 2018)

- Other transmission channels?
    - Consumer and investor behavior at NIR, and reversals?
    - Exchange rate (Ferrari, Kearns and   Schrimpf 2017), asset prices, expectations, risk taking channel etc.
    - other…

Key conclusions from Altavilla et al. 2020:

1

No ZLB in corporate deposits

2

Safety channel of transmission of NIR to deposits

3

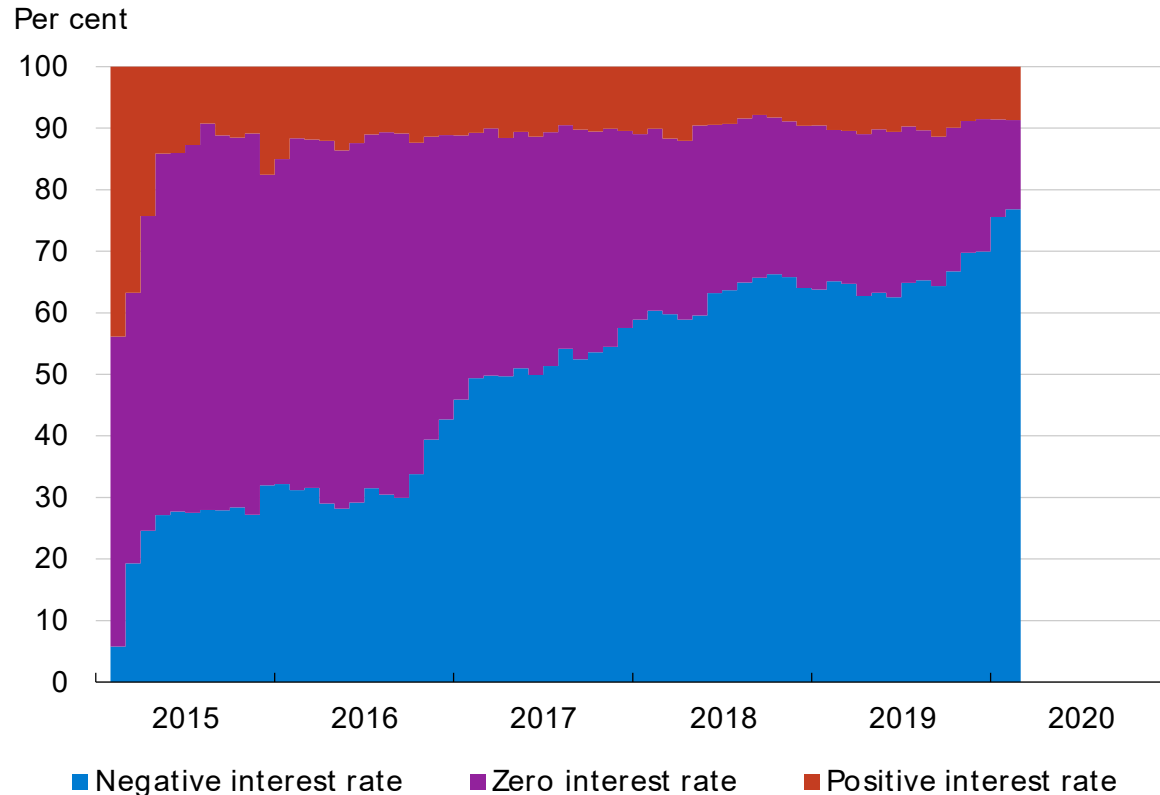"Corporate" channel of NIR transmission

4

Strong transmission to lending rates, no reversal?

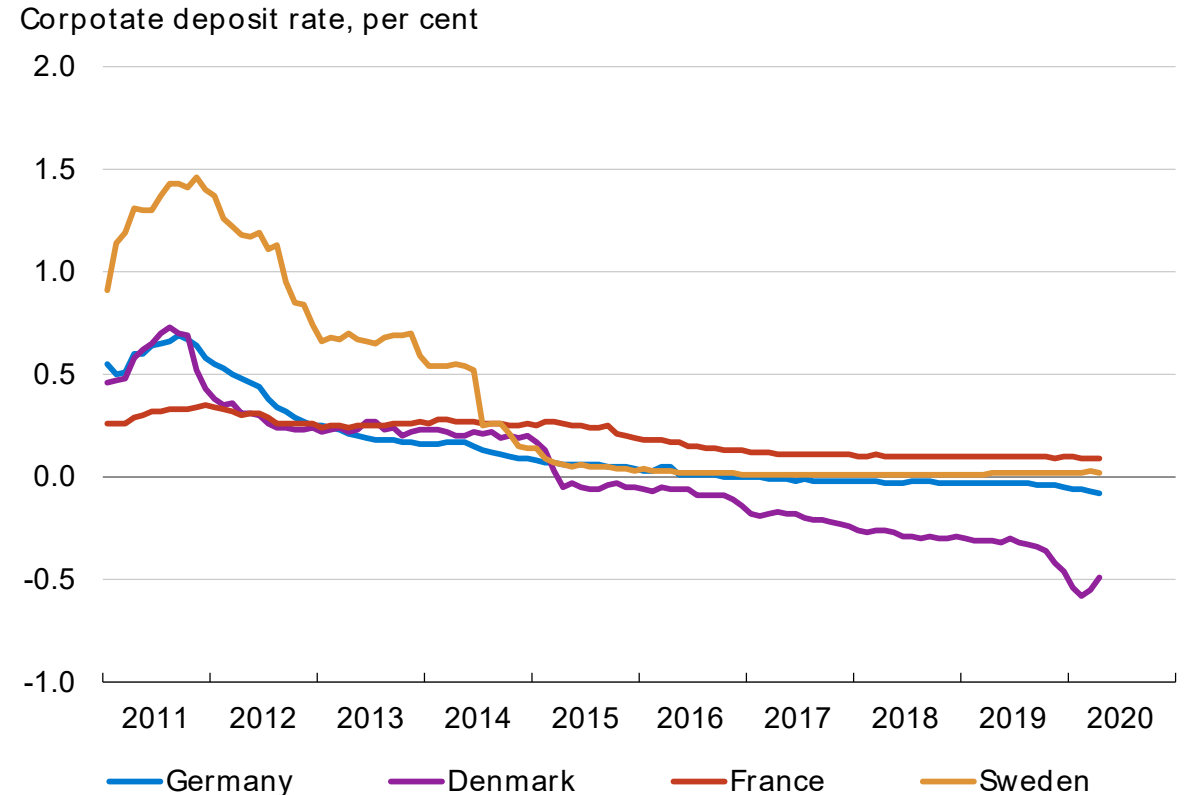# Denmark: a special case of negative interest rates

- NIRP introduced in 2012 as first country, and have gone furthest down (with CH)

- Variation and " exogeneity " (due to peg)

- Exceptional data: Data on firms and banks, linking firms' various deposits directly to the bank counterparty

- (drawbacks: shorter and smaller sample)

Policy Rates in Denmark and Euro Area

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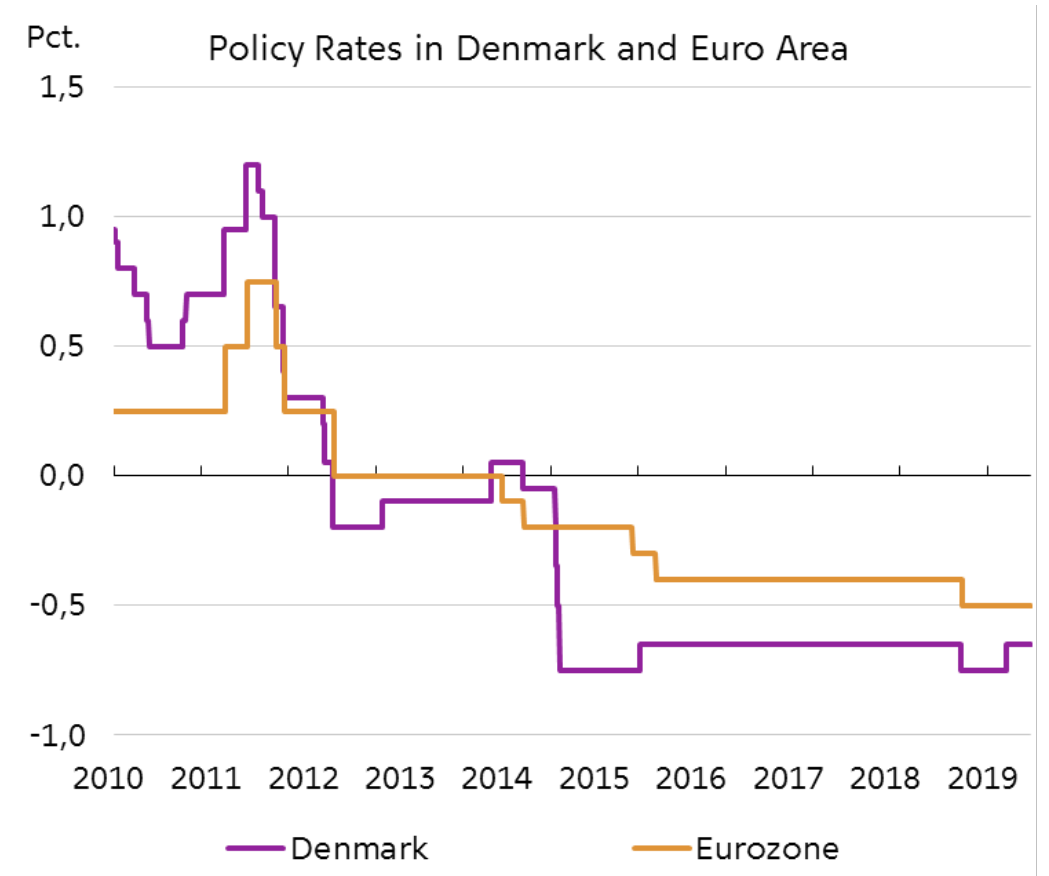
1. Zero not the lower bound: Deposit rates been negative in Denmark since 2015, continued broad movement down

Per cent

Corpotate deposit rate, per cent

Negative interest rate   Zero interest rate   Positive interest rate
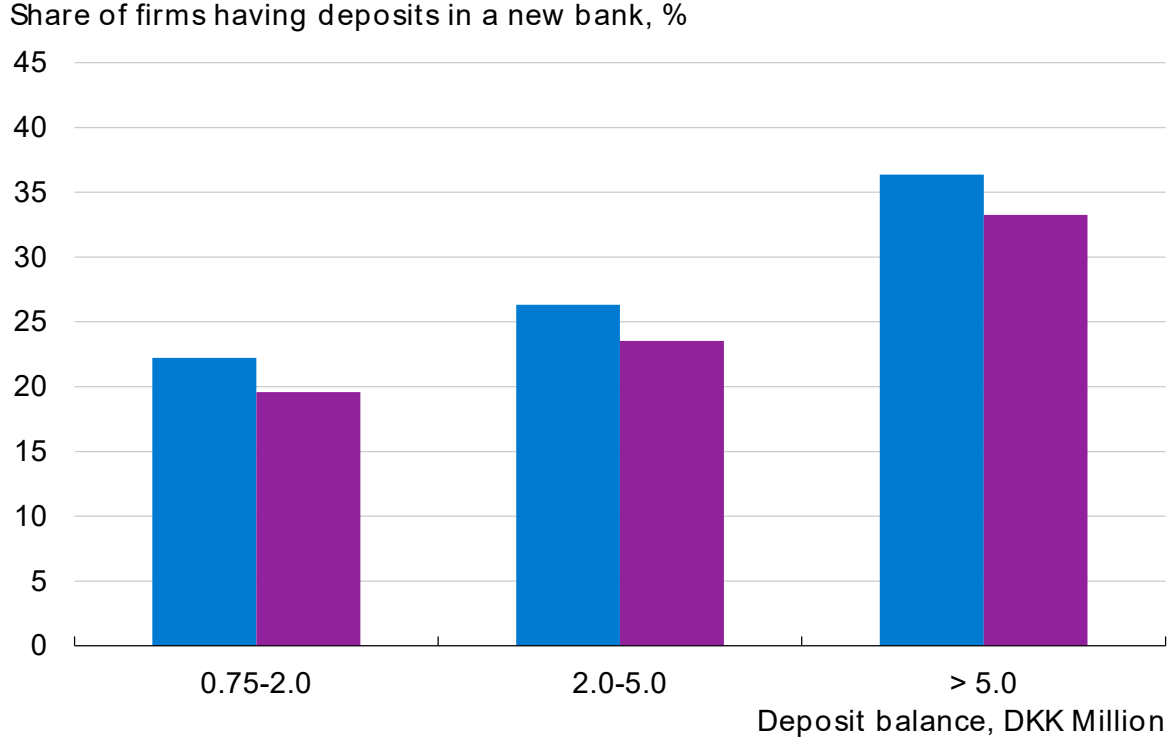
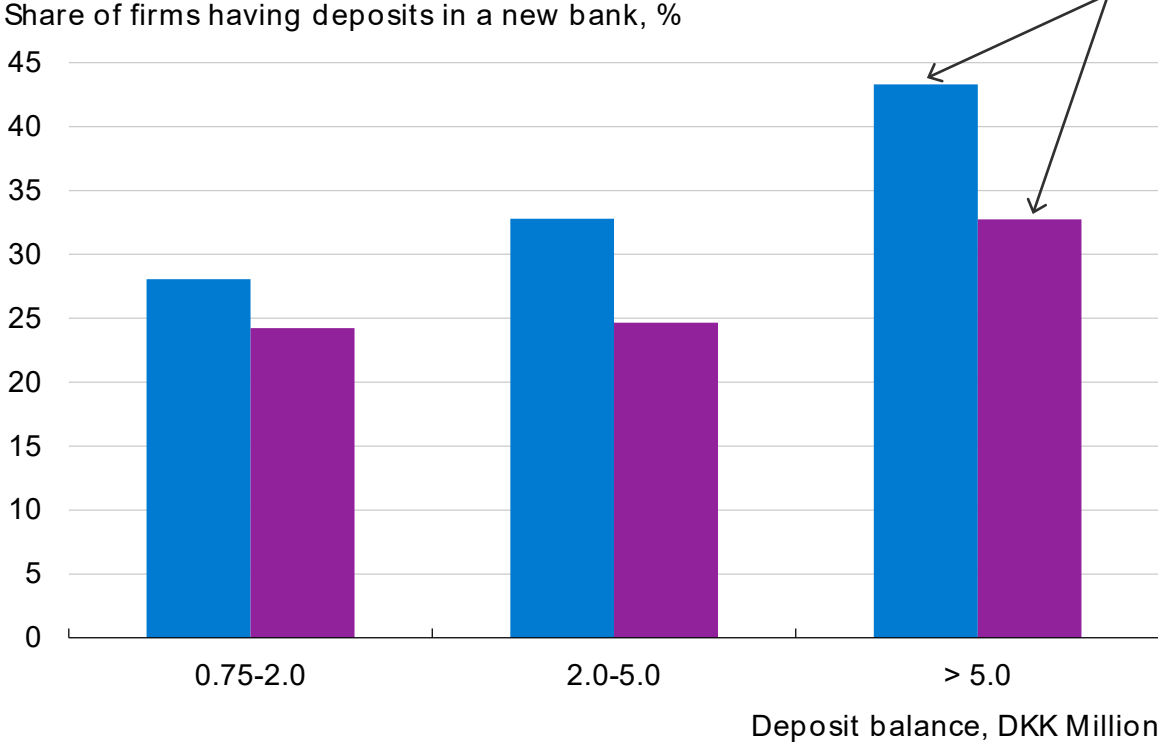Germany   Denmark   France   Sweden

Note: Lhs. chart: Share of outstanding amount of deposits from non -financial corporations.   Rhs. chart: Interest rate on overnight bank deposits from NFC's in local currency.
Source: Danmarks Nationalbank. and ECB.

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2. Safety channel and market power? Danish firms exposed to NIR move and reduce deposits

Large depositors 32% more likely to have a new bank connection the following year when exposed to negative rates

Share of firms having deposits in a new bank, %

Share of firms having deposits in a new bank, %

Deposit balance, DKK Million
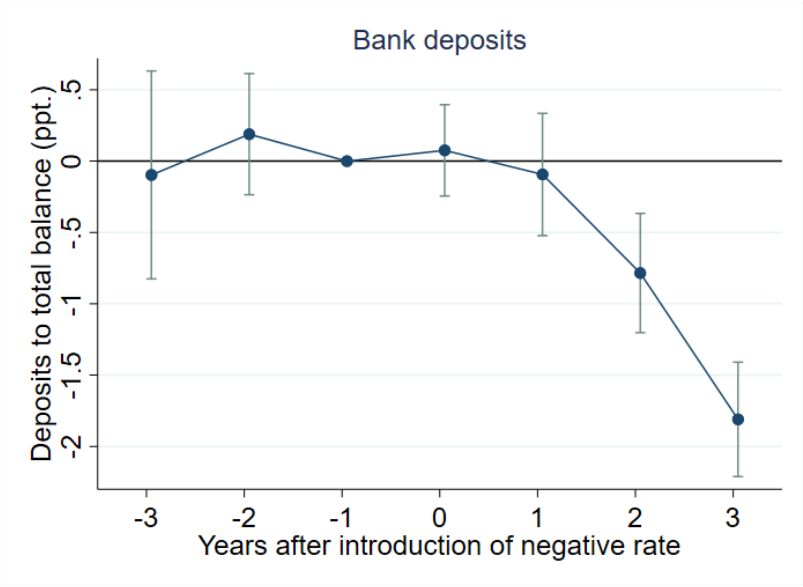
Deposit balance, DKK Million

■ Firms in banks that introduced negative deposit rates, year t-1 ■ Other firms

■ Firms in banks that introduced negative deposit rates, year t ■ Other firms

Note: Data covering all bank-firm connections in Denmark from 2014-2018, excluding sole proprietorships and firms with deposits < 750.000 DKK.
Source: Kim Abildgren and Andreas Kuchler, Do firms behave differently when nominal interest rates are below zero?, forthcoming working paper.
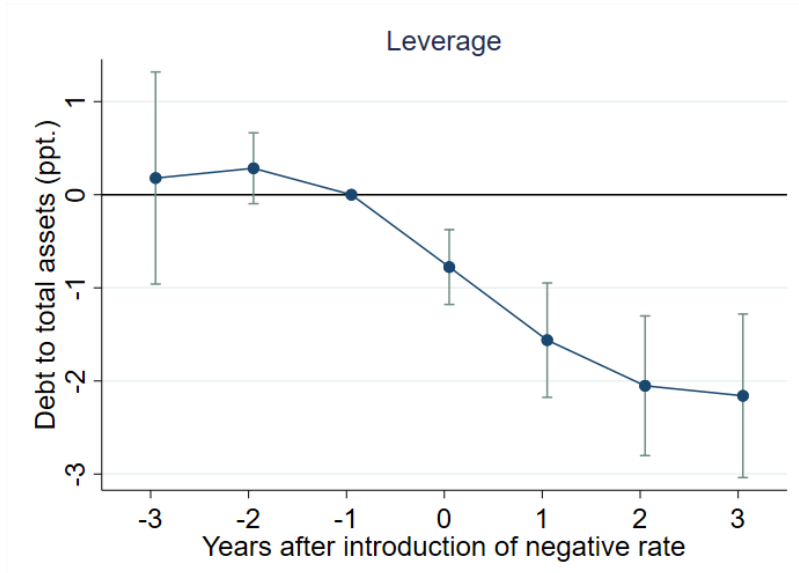
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3. Corporate channel : Evidence from Danish NFCs

Bank deposits

Liquidity

Leverage

Share of deposits to total balance reduced by 9% (1.8 percentage points) after 3 years
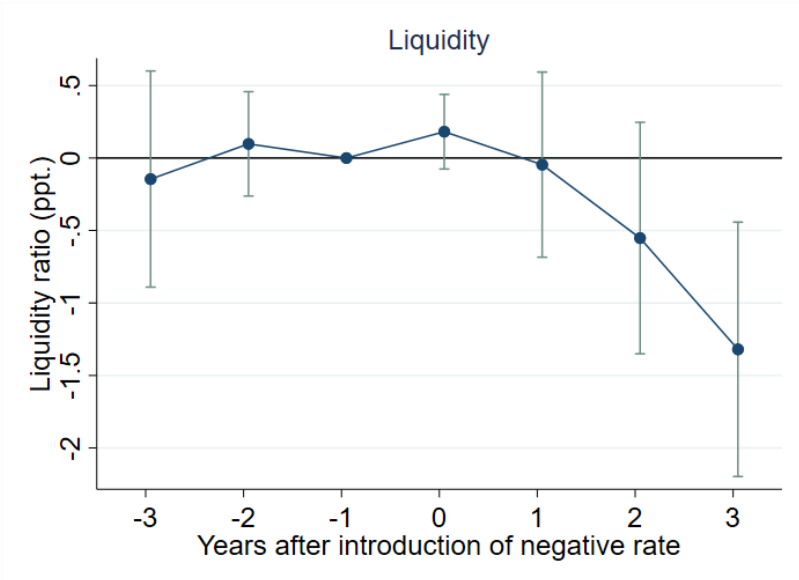
Liquidity reduced by 6% (1.3 percentage points) after 3 years
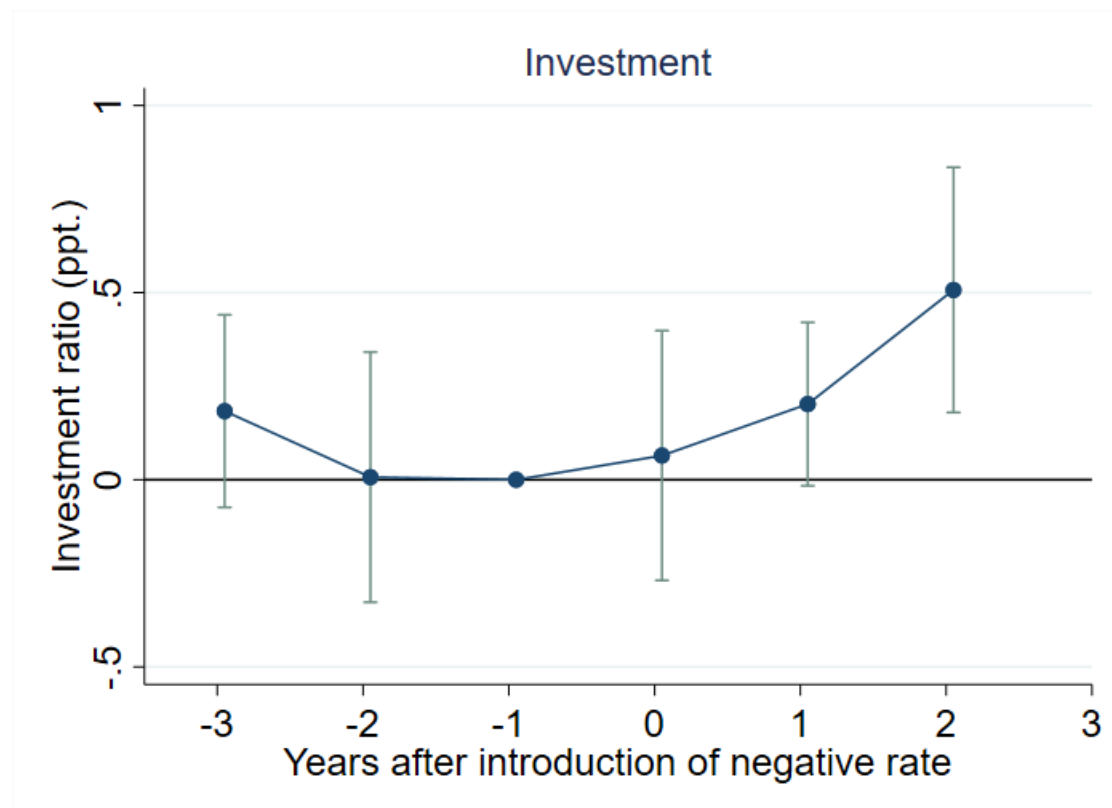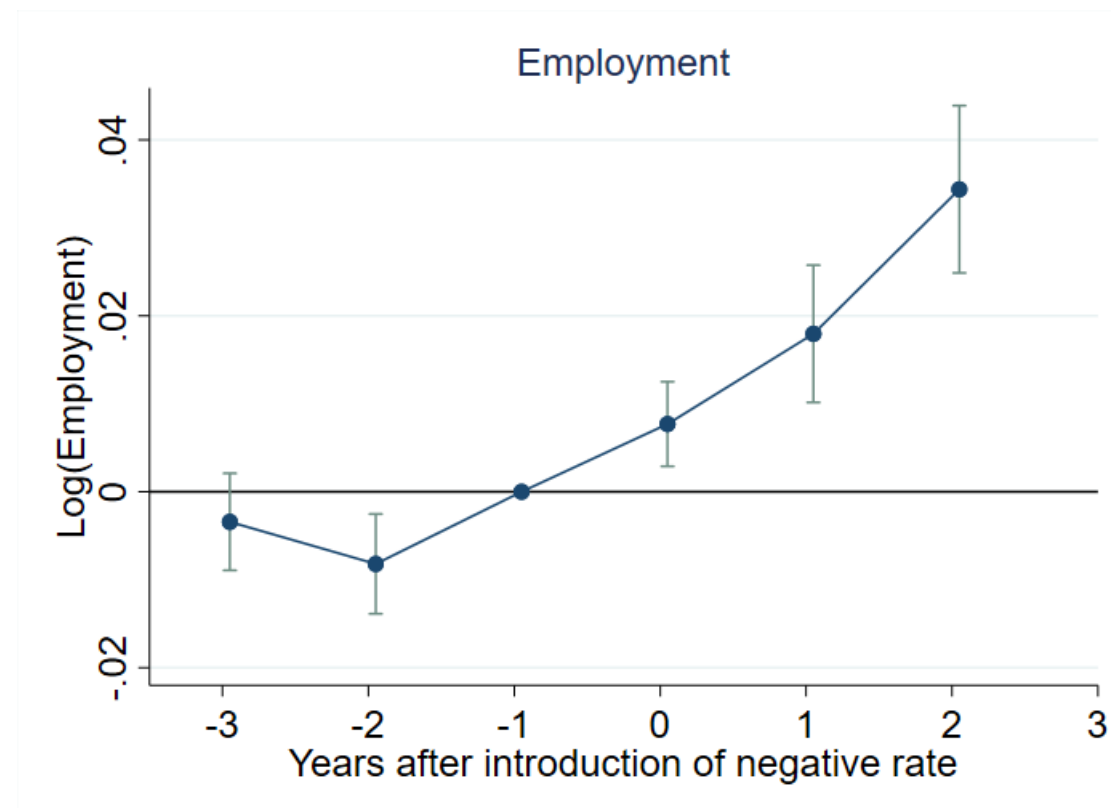
Leverage reduced by 3% (2.1 percentage points) after 3 years

Note: Event study estimates covering all Danish non -financial firms who were exposed to negative interest rates on deposits during 2014-2017.
Source: Kim Abildgren and Andreas Kuchler, Do firms behave differently when nominal interest rates are below zero ?, forthcoming Danmarks Nationalbank working paper .

3. Corporate channel ? Evidence from Danish NFCs (2)

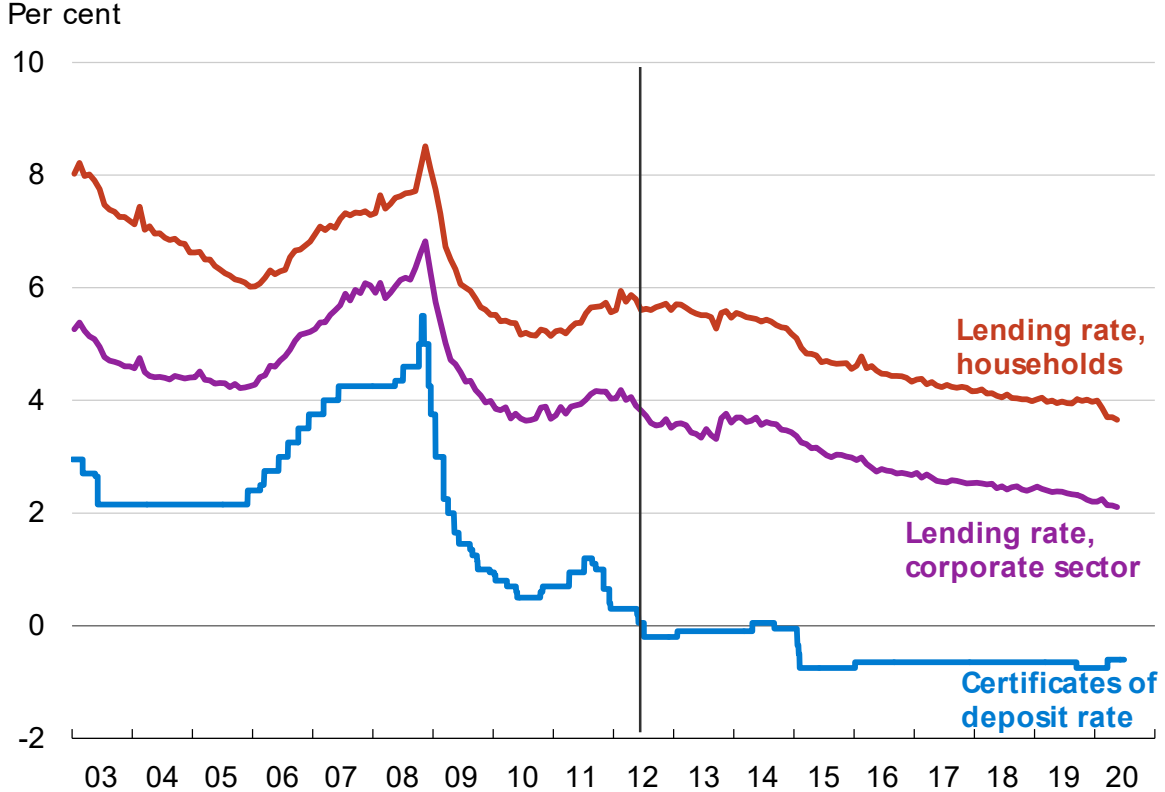Investment rate increased by 10% (0.5 percentage points) after 2 years

Employment increased by 3% after 2 years

Note: Event study estimates covering all Danish non-financial firms who were exposed to negative interest rates on deposits during 2014-2017.
Source: Kim Abildgren and Andreas Kuchler, Do firms behave differently when nominal interest rates are below zero ?, forthcoming Danmarks Nationalbank working paper.

4. Pass-through to bank lending rates consistent with evidence from Danish banks: no reversal
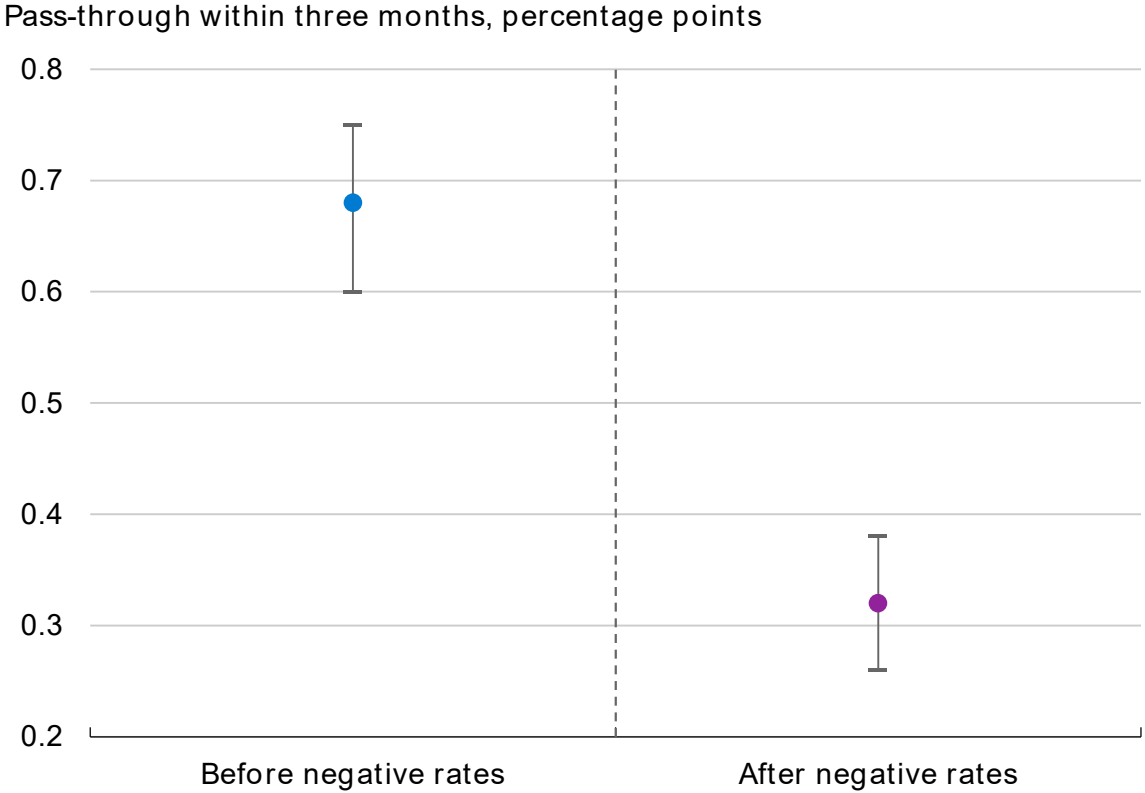
Pass-through within three months, percentage points

Per cent

Before negative rates   After negative rates

Lending rate, households

Lending rate, corporate sector

Certificates of deposit rate

03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20

Final remarks

NIRP is part of CB policy toolcase in world of low r* and low inflation. How does it perform?

Altavilla et al. important contribution:

- Evidence that NIRP works in a close to normal way through banking channels, transmitting to bank interest rates and spurring investment.

- No signs of reversal of transmission through the banking sector

- No signs of the ELB

Many questions remain

Remarkable that after many years with NIRP,

- No indications of cash hoarding

- No obvious economic imbalances or asset price bubbles (risk taking?)

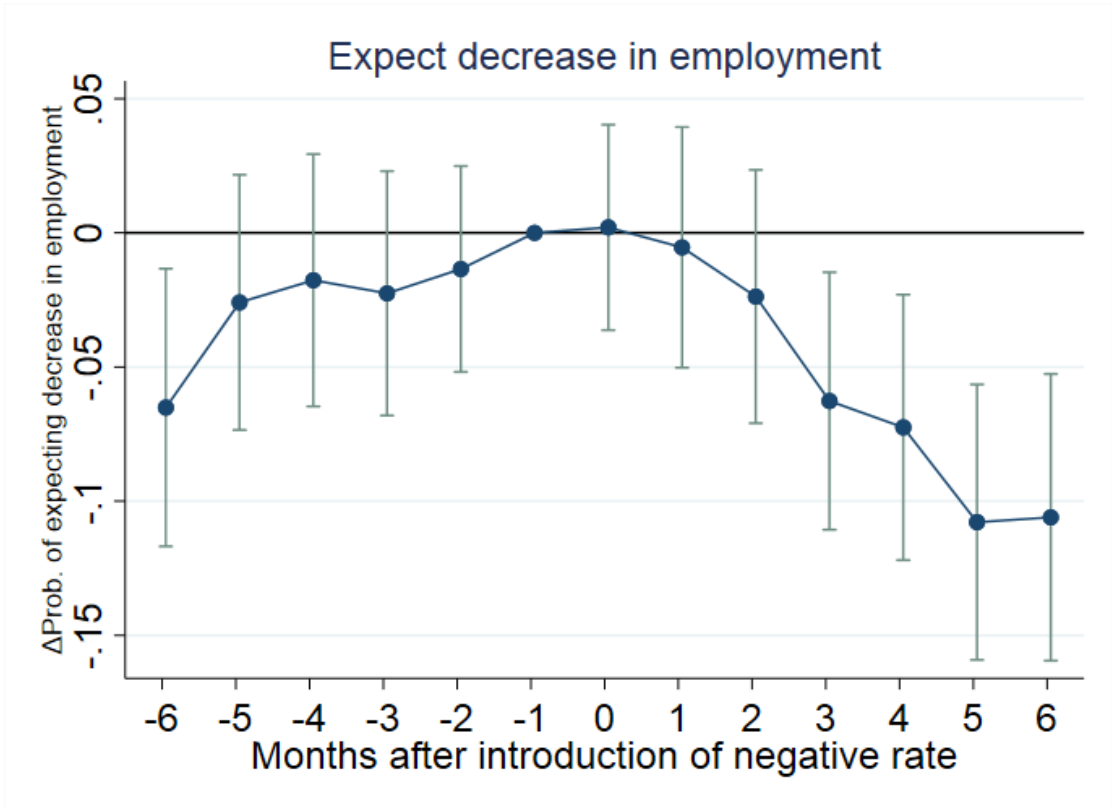- No signs of substantial negative effect on bank performance

Looking ahead,

- Will negative rates become even more 'business as usual', as banks increasingly cut deposit rates, or will we eventually see the emergence of undesirable side effects?

- Where is the lower bound?

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Appendix

Annex slides

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3. Corporate channel ? Evidence from Danish NFCs (3)

Expect decrease in employment

Probability of expecting decrease in employment reduced by 10 percentage points after 6 months

Expect decrease in turnover
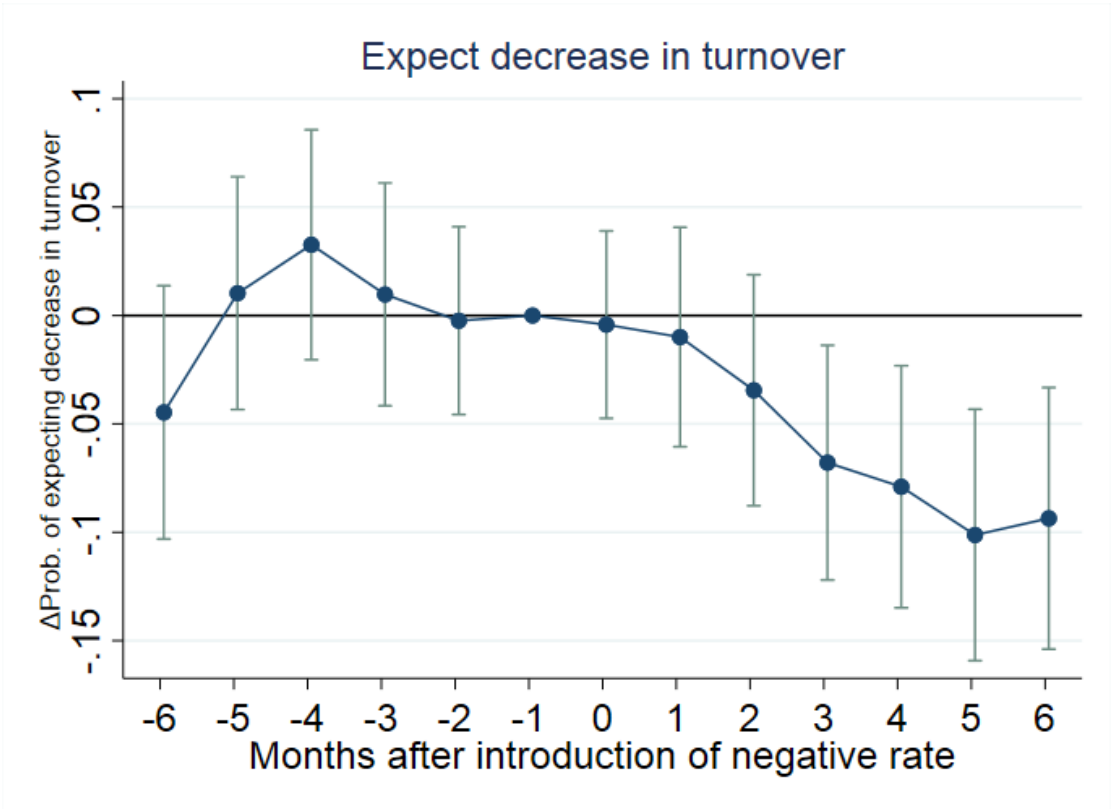
Probability of expecting decrease in turnover reduced by 10 percentage points after 6 months

Note: "Note: Event study estimates based on 1,439 Danish firms in the service industries which were exposed to negative interest rates on deposits during 2014 -2018.
Source: Kim Abildgren and Andreas Kuchler, Do firms behave differently when nominal interest rates are below zero?, forthcoming working paper .

4. No signs of reversal: NIR pass -through and lending growth do not depend on reliance on deposit funding

Pass-through within first three months, percentage points

Before negative rates | **After negative rates**

High-deposit banks | Low-deposit banks | High-deposit banks | Low-deposit banks

Average annual growth in lending, per cent

Positive rates | **Negative rates**

High-deposit banks | Low-deposit banks | High-deposit banks | Low-deposit banks

Upper 10 per cent
Upper 25 per cent
Median
Lower 25 per cent
Lower 10 per cent

Source: Jakob Feveile Adolfsen and Morten Spange, 2020, Modest pass-through of monetary policy to retail rates but no reversal, Danmarks Nationalbank, working paper no. 154.

No effect of deposit share on pass-through

$$\Delta i_{i,t}^b = \alpha + \sum_{k=0}^{2} \beta_k \Delta i_{t-k}^{CB} + \sum_{k=0}^{2} \gamma_k \Delta i_{t-k}^{CB} \times I_t^{neg} \times \mathbf{1}_{Highdeposit,i} + \sum_{k=0}^{2} \psi_{1,k} \Delta i_{t-k}^{CB} \times I_t^{neg}$$
$$+ \sum_{k=0}^{2} \psi_{2,k} \Delta i_{t-k}^{CB} \times \mathbf{1}_{Highdeposit,i} + \psi_3 I_t^{neg} \times \mathbf{1}_{Highdeposit,i} + \theta I_t^{neg} + \delta_i + \varepsilon_{i,t}$$

Table 2: *Regression shows no effect of reliance on deposit funding*

Pass-through and marginal effects	
Pass-through of high deposit before: $\sum_{k=0}^{2} \hat{\beta}_k + \sum_{k=0}^{2} \hat{\psi}_{2,k}$	0.64***
	(0.02)
Pass-through of low deposit before: $\sum_{k=0}^{2} \hat{\beta}_k$	0.69***
	(0.03)
Pass-through of high deposit after: $\sum_{k=0}^{2} \hat{\beta}_k + \sum_{k=0}^{2} \hat{\gamma}_k + \sum_{k=0}^{2} \hat{\psi}_{1,k} + \sum_{k=0}^{2} \hat{\psi}_{2,k}$	0.11*
	(0.06)
Pass-through of low deposit after: $\sum_{k=0}^{2} \hat{\beta}_k + \sum_{k=0}^{2} \hat{\psi}_{1,k}$	0.19***
	(0.05)
Marginal effect of high deposit before: $\sum_{k=0}^{2} \hat{\psi}_{2,k}$	−0.05
	(0.04)
Marginal effect of high deposit after: $\sum_{k=0}^{2} \hat{\gamma}_k + \sum_{k=0}^{2} \hat{\psi}_{2,k}$	−0.09
	(0.08)
Diff-in-diff estimate	−0.04
	(0.09)
N	3,176
No. of banks	18

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$

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Also no evidence that deposit share affects lending growth

$$\Delta \log(lending_{i,t}) = \alpha + \beta I_t^{neg} \times Depositshare_i + \theta I_t^{neg} + \delta_i + m_{i,t} + \delta_t + \varepsilon_{i,t}$$

$$\Delta \log(lending_{i,t}) = \alpha + \beta I_t^{neg} \times \mathbf{1}_{Highdeposit,i} + \theta I_t^{neg} + \delta_i + m_{i,t} + \delta_t + \varepsilon_{i,t}$$

Table 3: *Regression shows reduced transmission, but no reversal of transmission*

	1-month change in lending	3-month change in lending	6-month change in lending	12-month change in lending
$I_t^{neg} \times Depositshare_i$	0.009	0.03**	0.07**	0.12**
	(0.005)	(0.01)	(0.02)	(0.05)
$I_t^{neg} \times \mathbf{1}_{Highdeposit,i}$	−0.001	−0.001	−0.001	−0.006
	(0.003)	(0.009)	(0.02)	(0.04)
N	3,216	3,182	3,131	3,026
No. of banks	18	18	18	18

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$

Note: Data is from January 2003 to January 2020 and covers large and medium-sized banks in Denmark. The regression is an estimation of equation (3) and (4) not weighted by bank size as we are interested in investigating differences across banks, and it includes bank-fixed effects. Standard errors reported in parentheses are clustered on banks. Entities with a banking licence that cannot be classified as traditional banks are excluded. See appendix A for details on data.

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