Monetary Policy Spillovers During Normal and Negative Interest Rate Periods

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The opinions expressed are the sole responsibility of the authors and should not be interpreted as reflecting the views of Sveriges Riksbank
What we do

• We analyze possible changes in the effects of foreign monetary policy surprises, i.e. spillovers, on domestic asset prices in (domestic) negative and normal interest rate periods.

• We use non-linear local projection methods and identify foreign monetary policy surprises using standard high frequency identification techniques.

• We find that the negative interest rate period has significantly changed the spillovers of foreign monetary policy surprises compared with the positive interest rate period.

• Not in a detrimental way however. Lower foreign interest rates imply higher bank profits.

• Policy rates are at -0.5 but still above the Brunnermeier and Koby (2018) reversal rate.
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What we do (relative to the papers presented yesterday)

• Yesterday (~GSS 2005):

\[ \Delta y_t^{\text{Country } A} = \alpha + \beta \Delta x_t^{\text{Country } A} + \varepsilon_t \]

• This paper:

\[ y_{t+h}^{\text{Country } B} - y_t^{\text{Country } B} = \alpha + \beta h \Delta x_t^{\text{Country } A} + \varepsilon_t \]

Does \( \beta \) change when \( i < 0 \)?
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**Question:** Does \( \beta_h \) change when \( i_t^{\text{Country } B} < 0 \)?

*Country A = Euro Area or United States*
*Country B = Sweden*
Motivation

Policy motivation:

1. Riksbank has since Jan 2015 closely monitored ECB policy actions and adjusted its policy in order to mitigate strong (negative) effects on import prices.
2. Executive board decided in Dec 2017 to conclude net purchases of government bonds.
4. With domestic policy ‘on hold’ and policy rates negative.. How strong are spillovers and would spillovers differ from normal times?
Motivation

There is also a general interest in this question:

1. NIRP is currently prevalent but historically an extremely rare phenomenon.
2. Intense public debate regarding UMP/NIRP
3. Possible harmful impact of UMP/NIRP
4. Spillovers and interconnected economies
5. Research on NIRP has been quite limited

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These observations motivates our question:

Does a negative interest rate policy constitute a mere continuation of a conventional positive interest rate policy or does it fundamentally change the spillovers and transmission of foreign and domestic monetary policies?
Negative policy interest rates are prevalent
Intense public debate regarding NIRP...

Frankfurter Allgemeine (DEU)
- "Negative interest is unnecessary and unlawful"
- "ECB penalty rate is becoming more expensive for banks"
- "The first bank withdraws negative interest"

Dagens Nyheter (SWE)
- “Negative interest rates increase the gaps in society”
- “Two years with negative interest rates - risk of new financial crisis when borrowing is rewarded”
- "Do not complain about the negative interest rate, switch to a low-interest society"
... as well as polarized views among policymakers...

+ 

[In] the first full year with negative interest rates, [banks' net interest income] went up. [...] So all in all the [NIRP] experience has been positive.
Mario Draghi, April 2016

Negative nominal rates have reinforced forward guidance in the euro area, sped up the process of portfolio rebalancing ... and supported the effectiveness of the recent targeted longer-term refinancing operations.
Benoit Coeuré, July 2016

...overall, as a tool of monetary policy, negative interest rates appear to have both modest benefits and manageable costs.
Ben Bernanke, March 2016

There are large benefits to being able to reduce the lower bound on the short-term nominal interest rate by as little as fifty basis points.
Narayana Kocherlakota, February 2016

- 

The MPC is very clear that ‘lower bound’ is a positive number...
I am not a fan of negative rates. We see the negative consequences through the financial system in other jurisdictions...
Mark Carney, August 2016

A decrease in the real interest rate to -3 or even -4 percent will make little or no difference, perhaps [...] exposing the economy to greater financial instability.
Joseph Stiglitz, April 2016

Zero or negative real interest rates, when they become quasi-permanent, undermine the efficient allocation of capital and set the stage for bubbles, busts, and crises.
Kemal Derviş, March 2016

Far from encouraging lending and spending, negative interest rates at the central bank might work in the opposite direction.
William White, December 2014

...possibly not surprising since effects are a-priori/theoretically unclear..

- Why expect a change (or.. what is special about negative rates)?
  - Effects are a-priori/theoretically unclear
    - Brunnermeier and Koby (2018) - The Reversal Interest Rate*
    - Eggertsson et al. (2017)
    - Gertler and Karadi (2011)
    - Dell’Arriccia et al (2017)

- Common denominator: Net interest rate margins and Bank profitability

- Empirical question which effect that dominates.

- Methodology needs to sort out monetary policy from other forces as well as to be able to handle possible changes in propagation

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*Interest rate at which accommodative policy becomes contractionary. Lower bank NII & profits. Lower lending due to capital/liquidity constraint
Do Negative interest rates harm bank equity: A simple accounting framework

• Assume only 1 period

• Bank profit = Income from Lending and Investment Incomes – Cost of all Interest Bearing Deposits and Borrowing

\[ \text{Profit} = \Pi = i^L L + i^R R - i^d D - i^w W \]

• \( i^L \) interest rate on lending L
• \( i^R \) interest rate on reserves R
• \( i^d \) interest rate on core deposits D
• \( i^w \) interest rate on non-core (wholesale) deposits W

See e.g. Brunnermeier and Koby (2018) for a more realistic and fuller model of the bank's profit maximizing problem. Repricing frictions, probability of repayment and limited liability can easily be added but is excluded here for simplicity. Bank profit in Allesandri and Nelson (2015) with some of these features is given by \( \Pi = (i^d - i^d) L - (i^w - i^d) W + i^d K - Adj \) which is similar to the expression above.
Do Negative interest rates harm bank equity: A simple accounting framework

- With NIRP $i^r < 0$ and $i^d = 0$ and $W=0$
  - $\Pi = i^l L + i^r R$
  - $i^* \downarrow \Rightarrow i^l \downarrow \Rightarrow \Pi \downarrow \Rightarrow$ Market value of equity ↓

- With NIRP $i^r < 0$ and $i^d = 0$ and $W>0$
  - $\Pi = i^l L + i^r R - i^w W$
  - $i^* \downarrow \Rightarrow \Pi \uparrow \downarrow$ depend on $i^l \downarrow \geq i^w \downarrow$

- (Term) structure of income and costs important for how profits are affected (Samuelson 1945)

- Effects are a-priori/theoretically unclear
Identification: Our ”interventions / treatment”

• Follow Kuttner (2001) and Gürkaynak, Sack and Swanson (2005)
• We do not (and do not aim to) separate QE from conventional policy surprises (as a robustness check we do control for QE surprises).
• Use price changes of selected interest rate futures contracts around monetary policy announcements as instruments to capture the response of the economy to monetary policy.
  • Details: Federal funds futures (e.g.) settle based on the average effective federal funds rate that is realized for the calendar month specified in the contract.
  • Thus, daily changes in the current-month futures rate largely reflect revisions to the market’s expectations for the federal funds rate over the remainder of the month.
• High Frequency (intra/day) identification (GSS 2005)
  • Policy Rate Surprises
  • Forward Guidance Surprises
One illustrative (GSS) observation

- Intraday Trading in Federal Funds Futures Contracts on June 25, 2003
- The FOMC announced that it was lowering its target for the federal funds rate from 1.25 percent to 1 percent
- Many market participants (surveys & press reports) had been expecting the FOMC to ease policy by 50 bp at the meeting (40bp priced in).
- This decision is characterized as a 13 bp tightening surprise.

... the surprise is not necessarily in the same direction as the monetary policy action itself...

- If we collect these surprises from the U.S., the Euro area and Sweden over time we get our external instrument
Our interventions / treatments / surprises
Are positive surprises more common in NIRP vs PIRP? PDFs and CDFs of the Regime-Specific Shocks
Are positive surprises more common in NIRP vs PIRP? PDFs and CDFs of the Regime-Specific Shocks

Positive shocks are not more common in the NIRP period
Empirical framework

• Need to isolate monetary policy surprises in rest of the world (Euro area & U.S.)

• Negative Interest Rate policy Period.. Do spillover dynamics change?
  • Net interest rate margins and Bank profitability: unclear results a-priori.
  • Because of these multiple channels we follow Altavilla et al. (2017) and Ampudia and Van den Heuvel (2017) and measure the effects of monetary policy on equity prices considering these as a measure which capture the overall effect.

• Study propagation and spillovers by using a Non-linear local projections method (Jorda 2005) on daily data:

$$y_{t+h} = \tau t + F(z_t)(\alpha_h^- + \beta_h^- \varepsilon_t + \gamma_h^- x_t) + (1 - F(z_t))(\alpha_h^+ + \beta_h^+ \varepsilon_t + \gamma_h^+ x_t) + u_{t+h}$$
Empirical framework

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\[
\gamma_{t+h} = \tau t + F(z_t)(\alpha^+_h + \beta^+_h \varepsilon_t + \gamma^+_h x_t) + (1 - F(z_t))(\alpha^-_h + \beta^-_h \varepsilon_t + \gamma^-_h x_t) + u_{t+h}
\]

- The Responses (or ATEs)
- F(z) = 1 when Repo rate < 0
- a. Domestic Bank equity prices, $\Pi$
- b. Domestic Government Bond Yields, $i^w$
- c. Domestic Mortgage Lending Rates, $i^l$
- Foreign Monetary policy surprises
- Controls
Impulse Response of Domestic Banks’ and Financial Services’ Equity Prices ($\Pi$) to Positive Euro Area and U.S. Monetary Policy Surprises.

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Log SWE OMX Financials

Log SWE OMX Banks

Log SWE OMX Real Estate
Impulse Response of Domestic Banks’ and Financial Services’ Equity Prices \( (\Pi) \) to Positive Euro Area and U.S. Monetary Policy Surprises.

Spillovers to equity prices (bank profitability) notably different depending on type of monetary policy surprise:

a. Rate shocks lower equity prices
b. Forward guidance increase equity prices
Impulse Response of Domestic Banks’ and Financial Services’ Equity Prices (\( II \)) to Positive Euro Area and U.S. Monetary Policy Surprises.

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Spillovers to equity prices from U.S. are generally not significant.
Impulse Response of Domestic Banks’ and Financial Services’ Equity Prices (II) to Positive Euro Area and U.S. Monetary Policy Surprises.

Spillovers to equity prices (bank profitability) notably different in the NIRP period:

a. Rate shocks insignificant

b. Forward guidance decrease equity prices
Impulse Response of Domestic Banks’ and Financial Services’ Equity Prices ($\Pi$) to Positive Euro Area and U.S. Monetary Policy Surprises.

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Spillovers from U.S. borderline significant and similar to EA:
a. Rate shocks are insignificant
b. Forward guidance decrease equity prices (temporarily)
Impulse Response of Domestic Banks’ and Financial Services’ Equity Prices ($\Pi$) to Positive Euro Area and U.S. Monetary Policy Surprises.

Our results indicate that $i^* \downarrow \Rightarrow \Pi \uparrow$ when $i^r < 0$. 
Impulse Response of Domestic Government Bond Yields ($i^w$) to Positive Euro Area and U.S. Monetary Policy Surprises.

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Significant spillovers from Euro area monetary policy surprises
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Insignificant spillovers from U.S. monetary policy surprises.
Impulse Response of Domestic Government Bond Yields ($i^W$) to Positive Euro Area and U.S. Monetary Policy Surprises.

In NIRP times only significant spillovers from forward guidance surprises both from Euro area...
Impulse Response of Domestic Government Bond Yields ($i^W$) to Positive Euro Area and U.S. Monetary Policy Surprises.

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... and from the U.S.
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# Impulse Response of Mortgage Lending Rates ($i_t$) to Positive Euro Area and U.S. Monetary Policy Surprises.

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| NIRP |  |  |  |  |  |  |  |
| Euro Area    | U.S. |  |  |  |  |  |  |
| Rate         | Forw Guide | Rate | Forw Guide | Rate | Forw Guide | Rate | Forw Guide |
Impulse Response of Mortgage Lending Rates ($i^l$) to Positive Euro Area and U.S. Monetary Policy Surprises.

### Normal Times

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- Mortg Lend Rate SBAB 3m
- Mortg Lend Rate SBAB 1y
- Mortg Lend Rate SBAB 2y

### NIRP

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Impulse Response of Mortgage Lending Rates ($i^l$) to Positive Euro Area and U.S. Monetary Policy Surprises.
Summary

• Our results indicate that

\[
\text{When } i^R > 0 \quad \text{then } i^* \downarrow \Rightarrow \Pi \downarrow \text{ and } i^w \downarrow < i^l \downarrow
\]

\[
\text{When } i^R < 0 \quad \text{then } i^* \downarrow \Rightarrow \Pi \uparrow \text{ and } i^w \downarrow \& i^l \approx 0
\]

• Brunnermeier and Koby (2018):

\[
\text{When } i^R < i^{RR} \quad i^* \downarrow \Rightarrow \Pi \downarrow
\]
Are results driven by "low" rates rather than NIRP?

Impulse responses of Domestic Banks’ Equity Prices ($\Pi$) to a Positive Euro Area Forward Guidance Surprice:

Log SWE OMX Banks

NIRP, $F(z)=1$ when $i^r < 0$

Low but positive interest rates, $F(z)=1$ when $1 > i^r > 0$
Conclusions

- Spillovers differ notably between originating countries in normal times
- Spillovers differ between type of surprise in NIRP times
- Lower interest rates have a positive impact on bank profitability / equity prices
  - Not yet reached the Brunnermeier and Koby reversal rate where lower rates become contractionary
  - Bank characteristics matter
- We caution that our findings are based on event studies and subject to the typical caveats (see e.g. the discussion in Stock and Watson 2018).
- Moreover, central banks used several unconventional measures simultaneously which makes it challenging to disentangle the separate effects.
  - In Sweden the NIRP policy was accompanied with an asset purchase program. This makes it challenging to be fully certain that the changing dynamics that we observe are entirely due to the negative interest rate policy.
  - Controlling for identified QE shocks in EA, US and SWE does not change our results however.
Extra slides
ECB policy announcement on 02/10/2003

$Y =$ Sweden, Equity Indices, Nasdaq OMX, ICB Sector, Banks, Index, Close, SEK
ECB policy announcement on 03/12/2015

$Y = \text{Sweden, Equity Indices, Nasdaq OMX, ICB Sector, Banks, Index, Close, SEK}$