

A Prolonged Period of Low Interest Rates: Unintended Consequences

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Introduction

- After the GFC, monetary policy has remained highly accommodative in many advanced countries.
- Both short-term and long-term risk-free interest rates have declined to zero or below it, and risk premiums have been compressed.
- An increasing number of empirical studies has documented that a prolonged period of low interest rates (LIRE) has contributed to the build-up of financial vulnerabilities, resulting in higher systemic risk.
- In our paper, we examine the potential adverse effects of a prolonged period of low interest rates on financial stability from multiple perspectives.

Roadmap of the paper

- Historical overview of low and negative nominal and real interest rates – observable part of the story
- Estimation of natural interest rates: Laubach & Williams (2003) vs Juselius *et al.* (2016) approach – unobservable part of the story
- Financial vulnerabilities fuelled by low interest rate environment
 - ▶ Classification and transmission mechanism
- Impact on monetary policy implementation
 - ▶ Interest rate pass-through
 - ▶ Point of no return
- Policy considerations

Brief summary

- A prolonged period of low nominal interest rates is a new phenomenon.
- Estimates of natural interest rate are model-dependent:
 - ▶ Different approaches leads to different estimates which provides different policy recommendations with economic implications.
 - ▶ The need for monetary policy easing or tightening may differ across European economies, incl. euro area, and over time.
 - ▶ Financial factors and macro-financial linkages further amplify these differences, implying that business and financial cycles may not be well synchronized across countries, with the financial cycle being more desynchronized.
- LIRE can create and fuel financial vulnerabilities which then amplify impact of adverse shocks.
- LIRE can weaken IR pass-through and lead to “point-of-no-return” type of situation.

Historical overview (1/2)

- Negative real interest rates are nothing special.
- Negative nominal interest rates are less common and mostly applied after the GFC.

Table: How often were MP rates zero or negative (%)

	Nominal CB policy rate			Real CB policy rate		
	Total	Before 2008	2008+	Total	Before 2008	2008+
Euro Area	8.0	0.0	31.5	39.8	28.7	71.6
Other Europe	4.5	0.0	16.0	32.7	25.2	50.9
Asia	2.3	2.2	2.5	30.4	25.7	37.8
US	0.0	0.0	0.0	31.7	20.7	81.1
Canada	0.0	0.0	0.0	27.2	13.3	83.1
Japan	10.9	7.8	27.3	38.8	34.3	61.3

Source: BIS policy rate statistics and consumer price statistics, ECB database

Note: Frequency calculated as number of month when central bank policy rate was zero or negative divided by total number of month, in percent. Time period: 1M 1957-11M 2019. Sample includes: Euro Area: AT, BE, CY, FI, FR, DE, GR, IE, IT, MT, NL, PT, SI, SK, ES. Other European countries: CZ, DK, HU, IS, NO, PL, RO, SE, CH, UK. Asia: CN, IN, ID, IL, JP, KR, MY, PH, RU, TH, TR.

Historical overview (2/2)

- Negative real yields appeared especially in 1930s, 40s, 70s, and 2000s and 2010s.
- A massive and simultaneous **plunge in real interest rates** in many countries especially during **1970s**, caused by the combination of large inflation shocks together with financial repression.
- After the **GFC of 2008**, the fall in real interest rates caused by a combination of nominal rates being negative themselves, and low but positive inflation.
- So far, 9 central banks have employed **negative policy rates**: Japan, ECB, Denmark, Switzerland, Sweden, Norway, Hungary, Bosnia and Herzegovina, Bulgaria (some of them are pegged to euro).

Natural rate of interest

- The natural rate of interest is an **unobservable** variable which helps economists determine the neutral level of the monetary policy rate.
 - ▶ **Accommodive monetary policy**: the real interest rate is below the natural rate of interest.
 - ▶ **Restrictive monetary policy**: the real interest rate is above the natural rate of interest.
- Real interest rates all over the world have been on a **downward trend** for a very long time and have remained exceptionally low since the GFC.
- Does this mean that monetary policy has been highly accommodative for an extended period of time?
- Or have natural rates of interest declined along with monetary policy rates?
- The answer depends on the approach used to estimate the natural rate of interest.

Natural rate of interest: estimation

- Two estimation approaches:
 - ▶ Approach **without financial factors** (Laubach & Williams, 2003): the decline in natural rate explained by structural factors, not affected by monetary policy (in black).
 - ▶ Approach **with financial factors** (Juselius *et al.*, 2016): the decline can be explained also by cyclical factors, which are potentially affected by monetary policy (extension in blue).

$$\hat{y}_t = \alpha_1 \hat{y}_{t-1} + \alpha_2 \hat{y}_{t-2} - \alpha_3 \hat{r}_{t-1} - \alpha_4 \hat{lev}_{t-1} + \epsilon_{1t}$$

$$y_t^* = y_{t-1}^* + g_t + \epsilon_{2t}$$

$$\pi_t = \alpha_5 \pi_{t-1} + \alpha_6 \pi_{t-2|4} + \alpha_7 \hat{y}_t + \epsilon_{3t}$$

$$r_t^* = \alpha_8 r_{t-1}^* + \alpha_9 (g_t + z_t) + \epsilon_{4t}$$

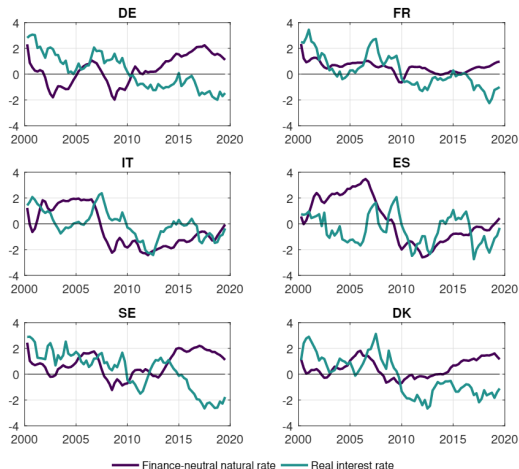
$$g_t = g_{t-1} + \epsilon_{6t}$$

$$z_t = \alpha_{10} z_{t-1} + \epsilon_{7t}$$

$$\hat{lev}_t = \alpha_{11} \hat{lev}_{t-1} + \alpha_{12} \hat{r}_{t-1} + \alpha_{13} \hat{dsr}_{t-1} + \epsilon_{5t}$$

- Estimated using Bayesian approach for 6 large European countries (4 EA and 2 non-EA).

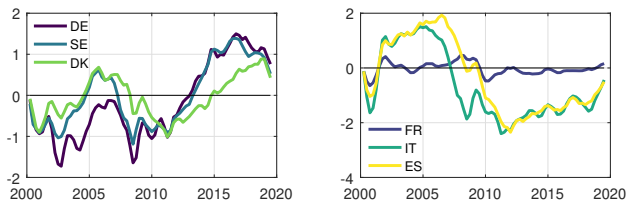
Natural rate of interest: results (1/2)



- Northern vs. Southern Europe
- **IT & ES** – real interest rates stayed far below natural rates before the GFC; natural rates have dropped much more relative to other countries after the GFC
- **DE, SE, & DK** – relatively greater need for MP tightening

Natural rate of interest: results (2/2)

Figure: Difference between natural rate with and w/o financial factors



- Financial factors (FF) play a significant role:
 - ▶ **IT & ES** – before the GFC, the natural rate with FF significantly higher, indicating the need for higher MP rates in order to be neutral or restrictive.
 - ▶ After the GFC, the natural rate with FF significantly lower, indicating the need for lower MP rates in order to be neutral or accommodative.
 - ▶ **DE, SE, & DK** – after 2015, FF have pushed up natural rate with FF relative to natural rate w/o FF.
- Excluding FF from estimating natural rate may advise for incorrect policy (too loose or too restrictive).
- If too restrictive, price stability may not be delivered; if too loose, financial vulnerabilities may be fuelled.

Financial vulnerabilities fuelled by LIRE (1/2)

- Financial conditions and financial vulnerabilities are not the same and they have different impact on financial stability.
 - ▶ **Financial conditions** usually refer to broad funding conditions.
 - ▶ **Financial vulnerability** refers to a weakness or a gap in the system.
 - ▶ Tightening or easing of financing conditions do not pose an immediate risk to financial stability.
 - ▶ However, if an adverse shock is amplified by financial vulnerabilities, it may potentially have serious negative impacts on the financial system and the economy as a whole.
- A prolonged period of highly accommodative monetary policy, manifesting as a LIRE, may improve **current** financial conditions while creating and increasing **future** financial vulnerabilities.
- Synthetizing the existing empirical literature, we define 5 broad categories and 22 subcategories of financial vulnerabilities which may be created and fueled by LIRE.

Financial vulnerabilities fuelled by LIRE (2/2)

Broad category	Subcategory
Excessive credit growth and leverage	<ol style="list-style-type: none"> 1. Overindebtedness and excessive debt service burdens of non-financial private sector (corporations and households) 2. Excessive leverage of banks / low capitalization in relation to assets 3. Excessive securitisation and use of special purpose vehicles / rapid increase in banks' off-balance sheet 4. Regulatory (capital) arbitrage and leakages 5. Excessive leverage of non-banking financial institutions 6. Use of derivatives to mimic leverage
Misvalued price of risk	<ol style="list-style-type: none"> 7. Deteriorating underwriting standards 8. Changes in portfolio quality 9. Compressed risk premiums on credit 10. Compressed risk premiums in various asset classes (equities, bonds, real estate) 11. Compressed term premiums 12. Undervalued risk parameters used to calculate regulatory capital requirements (PD, LGD)
Excessive maturity mismatch and market illiquidity	<ol style="list-style-type: none"> 13. Excessive use of short-term or floating rate debt by non-financial sector 14. Excessive lengthening of the asset maturities 15. Lower liquidity and solvency of insurance companies and pension funds
Misaligned incentives and moral hazard	<ol style="list-style-type: none"> 16. Moral hazard of high deposit banks with lower equity 17. Moral hazard of friendly corporate governance 18. Moral hazard in repo contracts with negative rates 19. Excessive size of financial institutions bearing critical functions (TBTF)
High interconnections and exposure concentration	<ol style="list-style-type: none"> 20. Rapid increase in common asset holdings / highly correlated risks in balance sheets 21. Higher interconnections between financial sectors of advanced and emerging market economies 22. Excessive size of CCPs coupled with riskier activities conducted by members and inadequate risk management 23. Shift from a banking-based financial system towards capital markets

Financial vulnerabilities: the common conduit (1/2)

- There are two recurring themes in the transmission – **low profitability** and engaging in **risky activities**.
- They serve as a conduit between too accommodative monetary policy, higher vulnerabilities, and amplified shock impact.
 - ▶ Neither of these two is a vulnerability or a risk on its own, but they are important parts of the transmission.

1) Profitability and LIRE:

- ▶ Both a low short-term interest rate and a flatter yield curve are associated with **lower net interest income** (Claessens *et al.*, 2018; Urbschat, 2018; Borio *et al.*, 2017; Lopez *et al.*, 2020; Altavilla *et al.*, 2018).
- ▶ The impact on **non-interest income** is not so straightforward: Borio *et al.* (2017); Lopez *et al.* (2020) identify negative relationship; Altavilla *et al.* (2018); Urbschat (2018) do not find any relationship.
- ▶ The impact on **loan loss provisions** is expected to be positive (i.e. negative on the overall profitability) (Altavilla *et al.*, 2018; Urbschat, 2018; Borio *et al.*, 2017).

Financial vulnerabilities: the common conduit (2/2)

- The overall impact of LIRE on banks' profitability can be significantly affected by **heterogeneity among banks**.
- The negative effect of LIRE on banks' overall profitability is stronger for:
 - ▶ banks with high share of deposits (Urbschat, 2018),
 - ▶ smaller banks (Claessens *et al.*, 2018; Lopez *et al.*, 2020; Urbschat, 2018; Molyneux *et al.*, 2019),
 - ▶ less capitalized banks (Óscar Arce *et al.*, 2018; Molyneux *et al.*, 2019),
 - ▶ banks with "interest-oriented" business models or weakly hedged against interest rate risk (Molyneux *et al.*, 2019).

2) Risk-taking and LIRE:

- ▶ LIRE can motivate banks to invest in more profitable but potentially riskier assets in order to achieve target return (**search-for-yield motive**) (Rajan, 2006; Gambacorta, 2009; Adrian & Shin, 2010; Borio & Zhu, 2012; Adrian & Liang, 2018; Jiménez *et al.*, 2014; Dell'Ariccia *et al.*, 2017).
- ▶ The search-for-yield behavior is also present among non-bank financial institutions (see, for example, Lysandrou, 2014; Ammer *et al.*, 2018; Hodula, 2019).

Monetary policy transmission in LIRE

- A prolonged period of LIRE may **weaken interest rate pass-through**.
 - ▶ The reduction in short-term interest rates can be less effective at very low levels of rates (Borio & Gambacorta, 2017).
 - ▶ Other studies do not support such an evidence (Horvath *et al.*, 2018; Altavilla *et al.*, 2020; Debortoli *et al.*, 2020).
- A prolonged period of LIRE may lead to a “**point-of-no-return**” situation.
 - ▶ A situation in which it may be **costly to normalize** monetary policy.
 - ▶ **High indebtedness** and excessive debt service burden → economies more sensitive to interest rate hikes (if coupled with a high share of loans at variable interest rates).
 - ▶ Squeezed term and risk premia increases the risk of abrupt repricing.
 - ▶ Very low interest rates may lead to resource misallocation and an increase in “**zombie**” firms (rolling-over the non-performing loans).
 - ★ Banerjee & Hofmann (2020) documents an increase of “zombie firms” from 4% in the 1980s to 15% in 2017 in advanced economies.

Policy considerations (1/2)

With respect to our findings, we propose a few policy considerations, taking into account the medium to long term perspective.

- Monetary policy should **act symmetrically** over the medium to long term.
 - ▶ The extent and the strength of monetary policy easing is offset by an amount of monetary policy tightening such that monetary policy is neutral in the medium-to-long term.
- Both the **short-term and long-term costs and benefits** of pursuing accommodative or restrictive monetary policy should be accounted for.
 - ▶ Short-term benefits are not favored at the expense of the long-term potential costs, and central banks take into account the overall financial and macroeconomic stability.
- **Monetary** and **macroprudential policies** need to be **coordinated**, and their interactions should be accounted for in order to find the best policy mix for the economy.
 - ▶ Strictly limiting the macroprudential policy to target financial stability and monetary policy to target price stability may prove counterproductive over the long term given the tight macro-financial links.

Policy considerations (2/2)

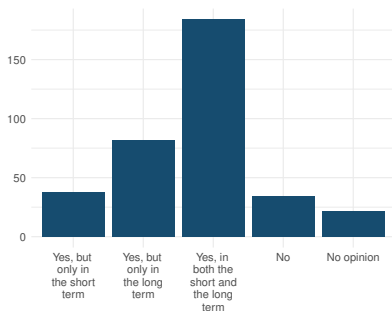
What could central banks do right now? A few examples.

- Discuss more often and extensively **the medium and long-term consequences** of monetary policy decisions for overall macroeconomic and financial stability.
- Incorporate financial factors and **macro-financial linkages** into the model framework of central banks use as a basis for monetary policy discussion and decision making.
 - ▶ Preferably, create **a suite of models** for internal comparison and discussion while maintain one approach for external communication to have a consistent and clear story.
- Create a framework for assessing the medium and long-term effects of monetary policy stance on inflation, inflationary pressures and economic growth.

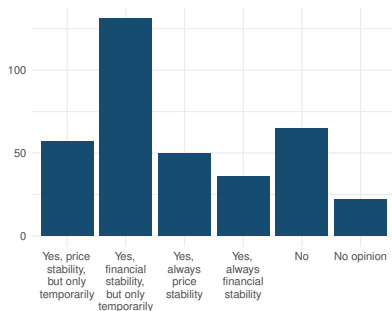
Survey among academics and central bankers

- In April 2021, the CNB conducted a survey on the macroprudential and monetary policy interaction and coordination, among other things.
- 361 complete questionnaires were collected.

Q: Does a low interest rate environment contribute to a build-up of financial imbalances?



Q: If there is a conflict between achieving price stability and financial stability, should a central bank favour one of the two?



Source: Czech National Bank's webpage; Malovaná *et al.* (2021)

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Appendix

Addressing financial vulnerabilities by macroprudential policy

- **Capital-based regulation** can be useful in preserving banks' resilience. Nevertheless, it may be difficult for some banks to meet this requirement in a prolonged period of low interest rates and low profitability.
- **Borrower-based measures** can prevent the provision of risky loans and improve underwriting standards. Even in this instance, however, the desired effect may not be achieved.
 - ▶ Borrower-based limits (LTV, LTI) may have distributional and reallocation effects (Acharya *et al.*, 2020; Peydró *et al.*, 2020)
- More stringent macroprudential policy and a prolonged period of LIRE may incentivize a shift of activities toward **non-bank financial institutions**, which are less regulated (Hodula, 2019; Hodula *et al.*, 2020).
- A **delay** between announcement and implementation may limit the effectiveness of macroprudential measures in mitigating existing systemic risks.
 - ▶ As such, macroprudential policy measures are best applied preemptively to build the needed resilience.