

# **Financial Cycle and Macroprudential Policy**

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- Objectives of presentation:
  - introduce macroprudential policy framework,
  - highlight key issues and important areas for research in the area,
  - provide insight into challenges faced by the Czech National Bank as a macroprudential authority.
- Key issues:
  - identifying financial cycle and position in the cycle,
  - finding equilibrium/normal/sustainable levels of credit, debt and real estate prices in the economy,
  - opting for appropriate tools and their calibration in coping with financial cycle and associated systemic risks.

*“...dignity has never been photographed...”*

*Bob Dylan (1991)*

# *I.*

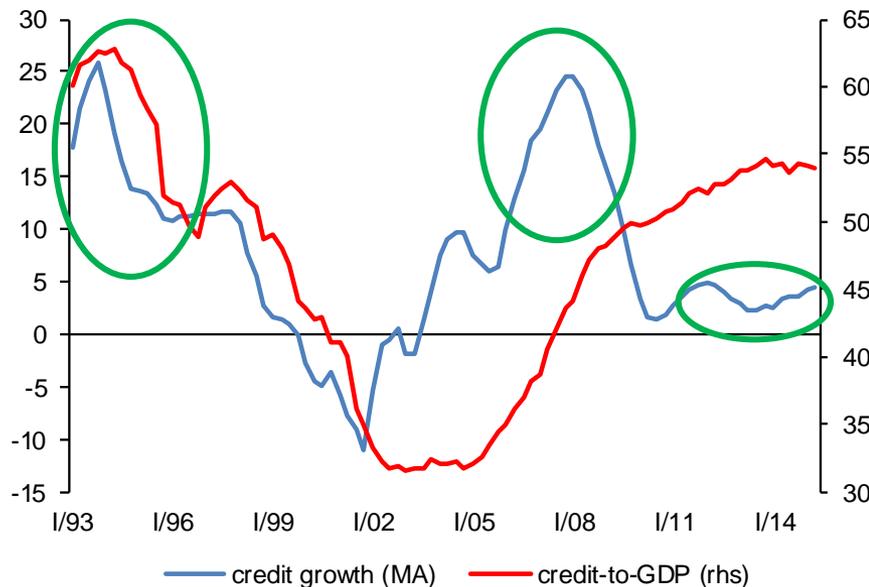
## *Concept of Macroprudential Policy*

- Following the global financial crisis, additional pillar for coping with systemic risk and maintaining financial stability – macroprudential policy framework – was put high on the agenda.
- Until the crisis, the concept of macroprudential policy was discussed primarily within the central banking community under the leadership of the Bank for International Settlements (BIS).
- After the crisis, the term “macroprudential” has become a buzzword (Clement, 2010) and the establishment of effective macroprudential policy framework has become one of the prime responses to crisis at both global and EU level.

- The term “macroprudential” as applied now is embrative and often used outside of the scope of its original meaning.
- The CNB still looks at the concept of macroprudential policies from relatively narrow perspective of the original BIS approach (e.g. Borio, 2003, Borio and White, 2004).
  - The objective of a macroprudential approach in the BIS tradition falls within the macroeconomic concept and implicitly involves monetary and fiscal policies (Borio and Shim, 2007; White, 2006).
  - In the BIS tradition, the phenomenons of financial/credit cycle and financial market procyclicality (mainly the procyclical behaviour in credit provision) stand centrally (Borio, Furnine and Lowe, 2001; Drehmann et al., 2012; Borio, 2014).
  - The CNB’s analyses have also been focused mainly on the time dimension of systemic risk (risks associated with procyclical behaviour in credit cycle).

- Credit upswing in early 1990s was followed by sharp increase in credit losses and major financial crisis.
- Credit “boom” of 2005-2008 had benign consequences.

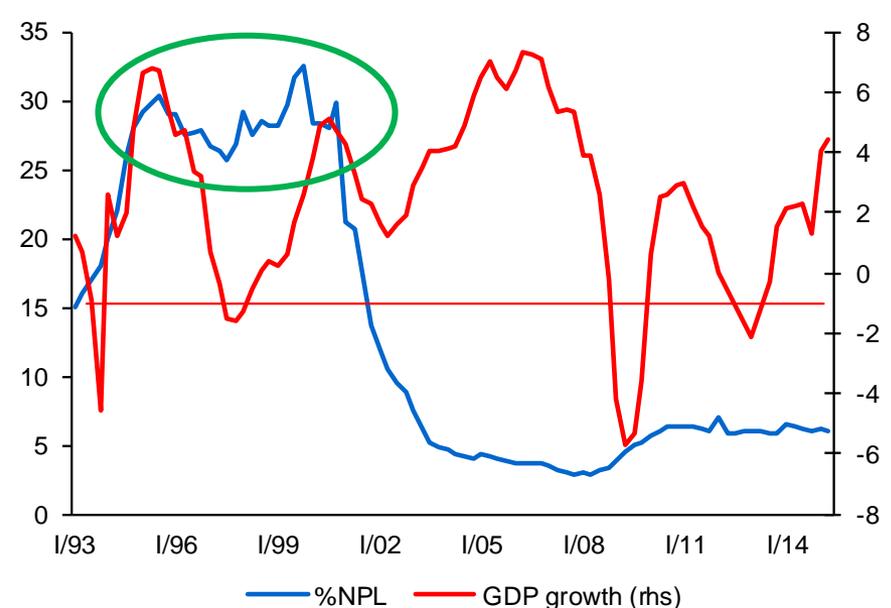
**Credit cycle in the Czech Republic**  
(1993-2015 H2), v %)



Source: CNB

Note: Credit growth is year-over-year increase in total bank credit.  
% NPL is the share of nonperforming loans on total bank credit.  
Data from the beginning of 1990s are based on authors' estimates.

**GDP growth and credit risk in the Czech Republic**  
(1993-2015 (H2), in %)



Source: CNB

Note: % NPL is the share of non-performing loans on total bank credit.  
Data from the beginning of 1990s are based on authors' estimates.

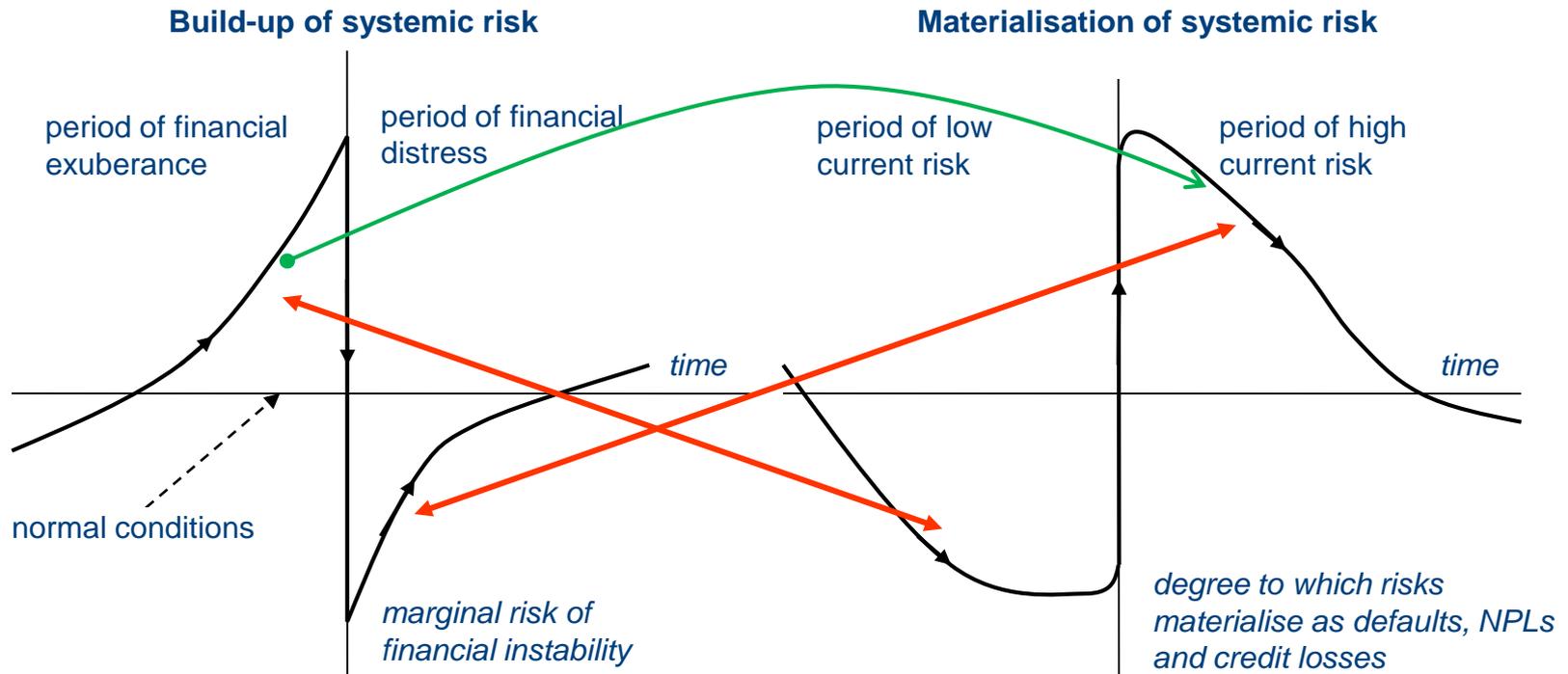
- Financial market structures surely matter as well.
  - The other stream of macroprudential thinking is less macro-oriented and focusing on individual institutions and their mutual interactions.
  - In this stream systemic risk arises primarily through interlinkages and common exposures to risk factors across institutions, i.e. canonical models of financial instability like Diamond and Dybvig (1983).
  - Sources of structural or cross-sector dimension of systemic risk (common exposures among institutions, network risks, infrastructure risks, contagion ...) have been intensively studied by both academia, international institutions, and national supervisory or macroprudential authorities.
  - In small economies structural dimension can materialize through contagion from external environment.

- The experience commands that the time dimension of systemic risk has to be regarded as more important.
- However, the time and cross-sectional dimensions to a large extent evolve jointly and cannot be strictly separated.
- The time dimension shows up in degree of solvency, while the cross-sectional dimension manifests itself in the quality of financial institutions' balance-sheet liquidity/funding (Shin, 2010).
  - Solvency and liquidity are interconnected.
  - Liquidity problems can transform quite quickly into insolvency issues.

- Traditional microprudential regulation and supervision focus on resilience of individual financial institutions to mostly exogenous events.
- Macroprudential policy:
  - focuses on the stability of the system as a whole,
  - monitors primarily endogenous processes in which financial institutions that may seem individually sound can get into a situation of systemic instability through common behaviour and mutual interaction (Frait and Komárková, 2012),
  - fights against the risk of the fallacy of composition (wrong assumption that the state of the whole is the sum of the state of seemingly independent parts), the risk that for the trees the forest is not seen.
- Hanson et al. (2011) mark the microprudential approach as partial equilibrium conception while macroprudential approach as one in which general equilibrium effects are recognized.

## *II. Systemic Risk In Financial Cycle*

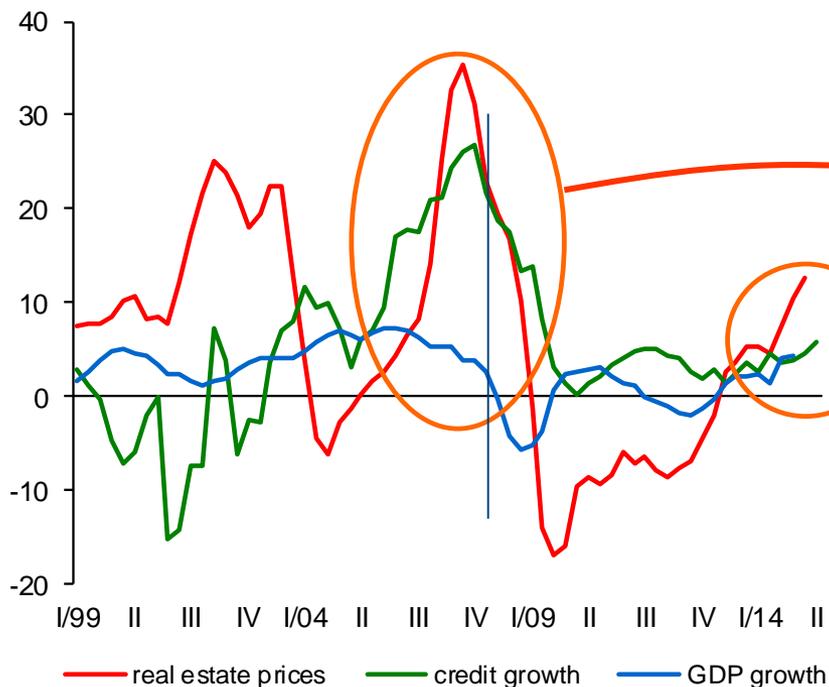
- In a financial cycle, systemic risk evolves differently in two stages: accumulation (build-up) and materialization (manifestation).
- Note the financial (in)stability paradox:
  - System is most vulnerable when it looks most robust.
  - Risk is not born in period of distress.



- Forward-looking approach in both analyzing and policy-making needed:
  - Bad loans are being created in good times, true information about it comes in subsequent bad times.
  - Low level of non-performing loans is not a sign of robust banking sector.

## Procylical behaviour in the Czech economy

(1999-2015 H2, y-o-y in %)

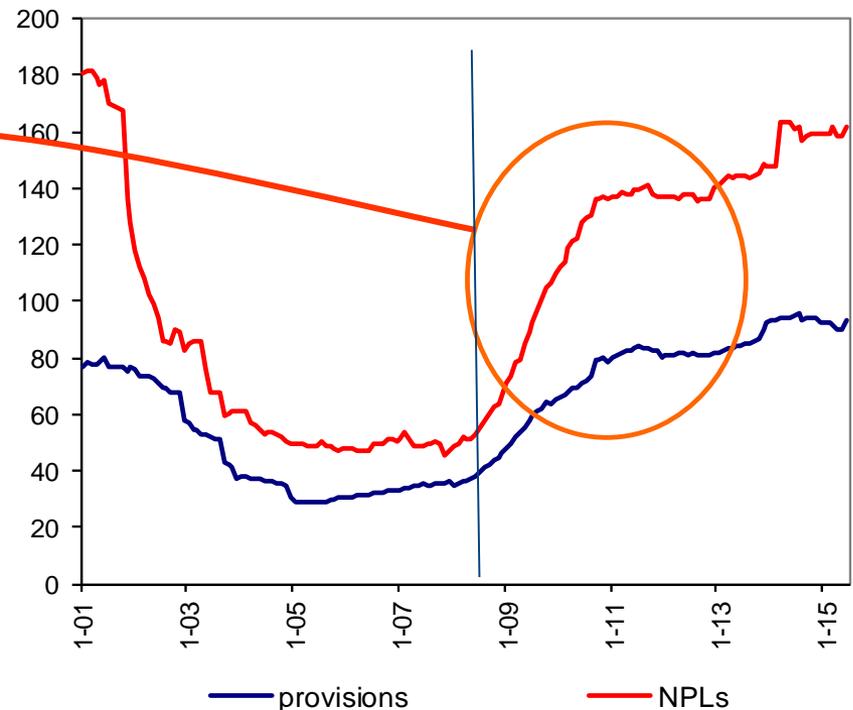


Source: CNB, IRI

Note: Offer prices for Prague residential real estate.

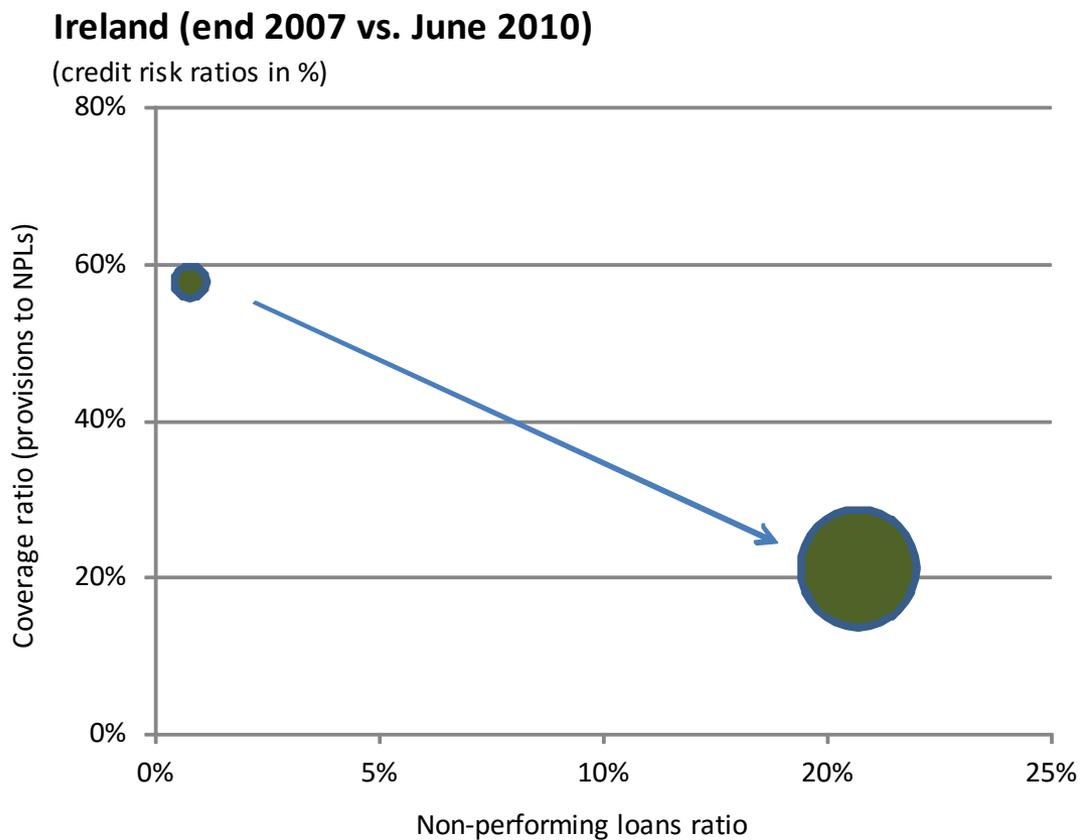
## Provisions and NPLs (bn. CZK)

(January 2001-June 2015)



Source: CNB

- Remember Ireland – it looked so well in 2007.



Note: Size of the ring indicates relative volume of non-performing loans

Source: Central Bank of Ireland

- Paradox of financial instability necessitates forward-looking approach in systemic risk detection and measurement.
  - Do not look so much at measures of systemic risk materialization like indices of financial stress.
  - Focus on actual risk, not a perceived one (Danielsson et al., 2012)!

### Endogenous bubble



- Backward-looking perspective (where we have moved)

- A strengthening of the resilience of the Czech financial sector to potential adverse shocks:
  - a rise in capital adequacy,
  - favourable liquidity developments,
  - positive changes in risk management by financial institutions.

Financial sector resilience	
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Cyclical risks	
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Structural risks	
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Financial sector resilience



Cyclical risks



Structural risks



- Forward-looking perspective (how strong the potential sources of risk are)

- A moderate decline in structural risks:
  - introduction of the systemic risk buffer,
  - a decrease in interconnectedness of institutions in the financial sector.
- A slight increase in cyclical risks:
  - a recovery in demand for loans and an easing of credit standards,
  - a drop in interest rates on loans and interest rate margins,
  - a decrease in yields on high-quality assets to very low levels.

- Macroprudential policy has to be
  - neutral in normal times
  - pre-emptively counter-cyclical in not-so normal times:
- Counter-cyclical approach requires
  - increase preventively the resilience of the system, in the accumulation phase of systemic risk, against the likelihood of emergence of financial instability in the future by
    - creating capital and liquidity buffers,
    - limiting procyclicality in the behaviour of the financial system
    - containing risks that individual financial institutions may create for the system as a whole.
  - mitigate the impacts, in the materialization phase of systemic risk, of previously accumulated risks if prevention fails.

- Key sources of systemic risks and appropriate policy tools
  - as reflected in the ESRB's Flagship Report and Handbook on Macro-Prudential Policy in the Banking Sector published in March 2014.

<i>Source of systemic risk (of vulnerability)</i>	<i>Appropriate tool</i>
<ul style="list-style-type: none"> <li>• Undue leverage</li> <li>• Excessive credit growth accompanied by lenient lending practices</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Countercyclical capital buffer</b></li> <li>• Through-the-cycle provisioning</li> <li>• LTV and LTI (PTI) limits</li> <li>• Leverage ratio</li> <li>• Increased risk weights for specific sectors</li> </ul>
<ul style="list-style-type: none"> <li>• Shortage of quick liquidity</li> <li>• Maturity mismatches regarding asset and liabilities</li> <li>• Unstable structure of bank funding</li> </ul>	<ul style="list-style-type: none"> <li>• LCR</li> <li>• NSFR</li> <li>• LTD ratio or core funding ratio</li> </ul>
<ul style="list-style-type: none"> <li>• Excessive interconnectedness of financial institutions</li> <li>• Complexity and opacity of financial sector</li> <li>• Reliance on bail-out of large and important institutions</li> </ul>	<ul style="list-style-type: none"> <li>• SIFI capital surcharges</li> <li>• Systemic risk capital surcharges</li> </ul>
<ul style="list-style-type: none"> <li>• Excessive concentration in assets or liabilities of financial institutions</li> </ul>	<ul style="list-style-type: none"> <li>• Large exposure limits</li> </ul>

### ***III.***

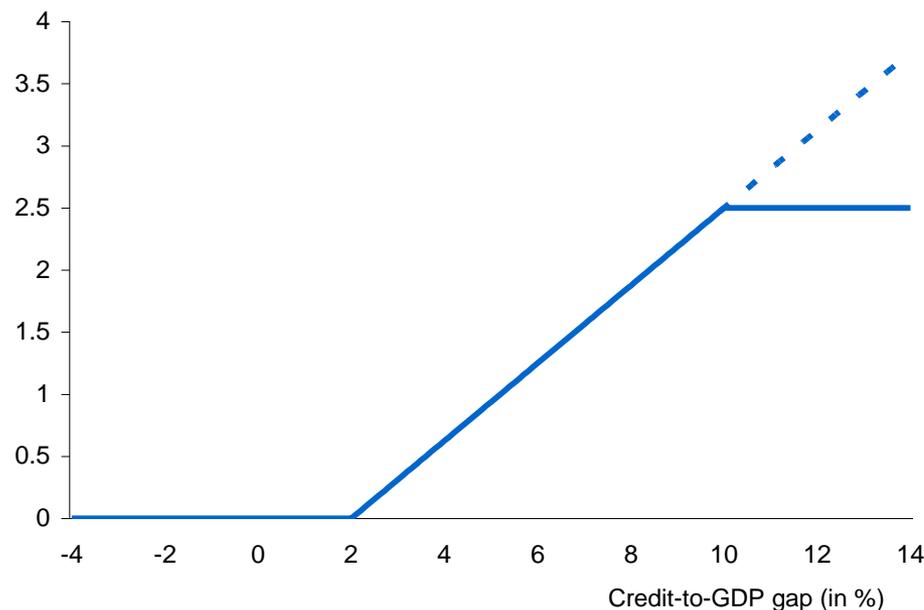
## ***Overall risk assessment and responding to cyclical risks***

- Countercyclical capital buffer (CCB henceforth) is genuine macroprudential tool:
  - should primarily protect the banking sector and general economy from the after-effects of excess aggregate credit growth,
  - ensure that the banking sector has the capital buffer on hand to help maintain the flow of credit in the economy when the broader financial system experiences distress after a credit boom.
- Some believe that the CCB could be used for taming a credit boom.
  - This potential moderating effect on the credit creation should be viewed as a positive side benefit, rather than the primary aim of the CCB regime.

- Common reference guide\* for setting the CCB is based on the aggregate private sector credit-to-GDP gap
  - a gap between currently observed value and the calculated long-term trend of private sector credit to GDP

### Countercyclical capital buffer

(% of RWA as a function of credit-to-GDP gap in pps)

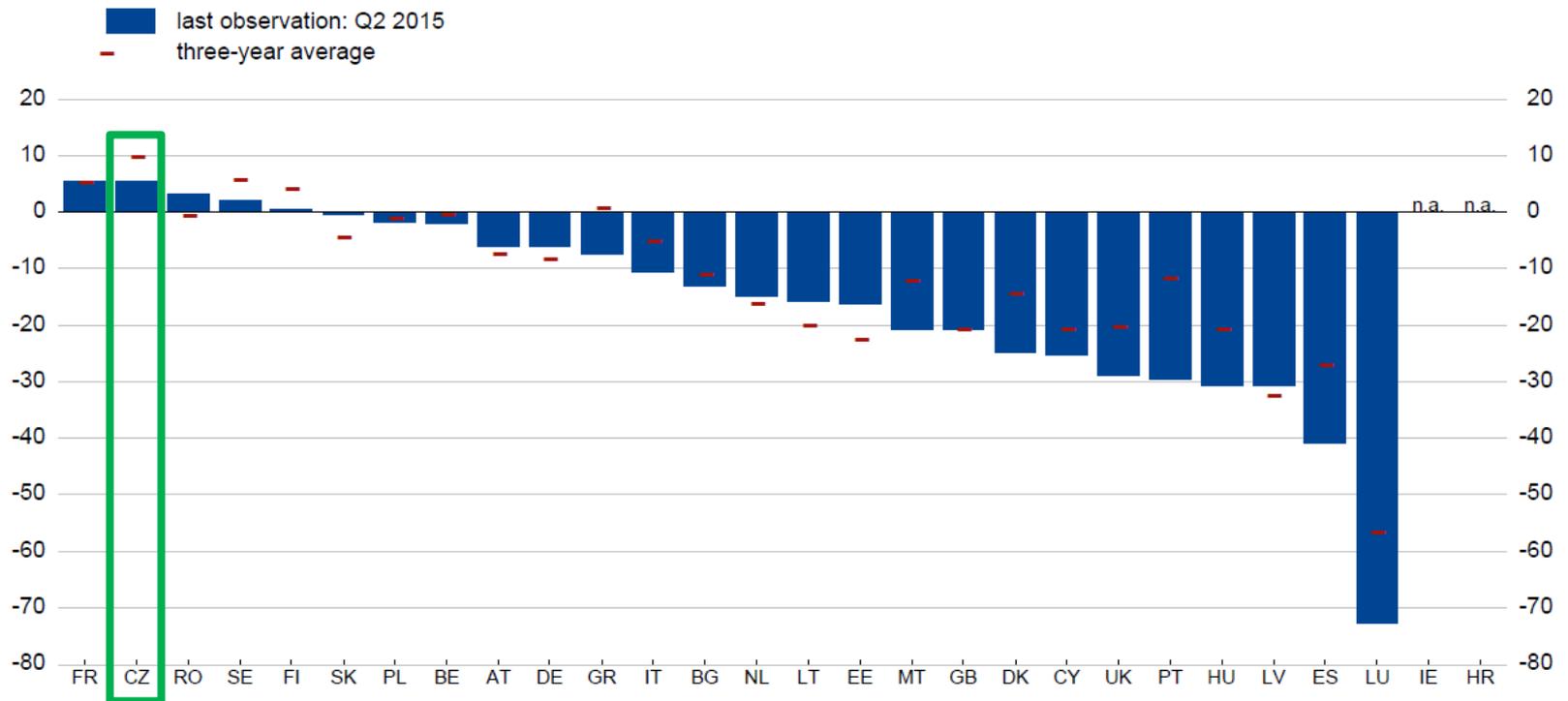


- for calculation of the long-term trend, the Basel committee suggests using the Hodrick-Prescott filter with a high smoothing parameter
- national authorities can set the buffer rate above the 2.5% limit envisaged in Basel III

- Estimates of credit-to-GDP gap published quarterly in ESRB Risk Dashboard suggest so.

## 2.2 Domestic credit-to-GDP gap

(EU; percentages)

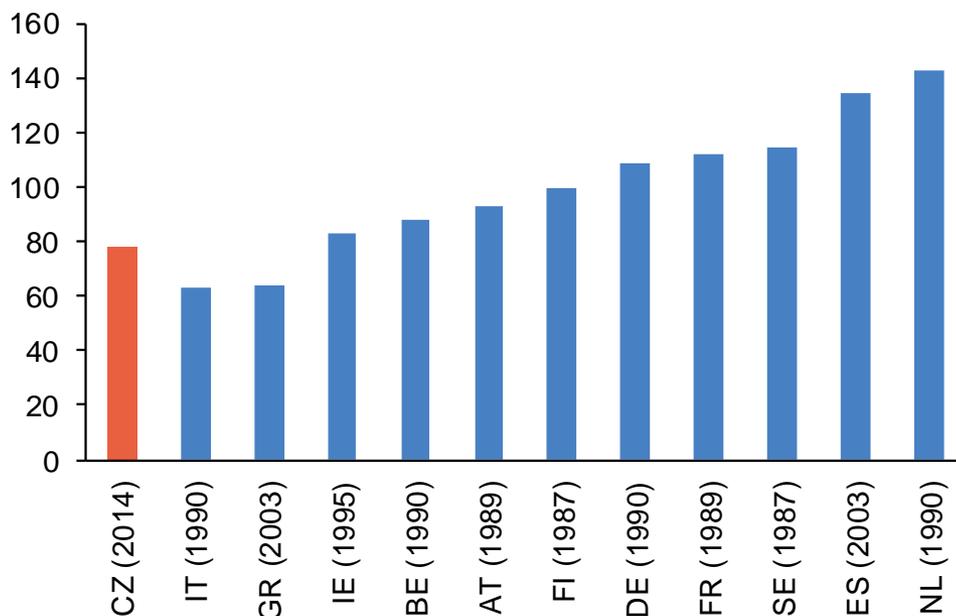


Sources: European Commission, BIS, ECB and ECB calculations.

- Czech Republic has lower level of credit-to-GDP than most European countries when at similar level of economic development (measured by GDP per capita).
- Other features of credit growth in the Czech Republic also do not indicate strong boom with the build up of system-wide risk.

## Credit-to-GDP for similar level of economic development

(GDP per capita in 2014 USD = 19.5 ths USD, in %)

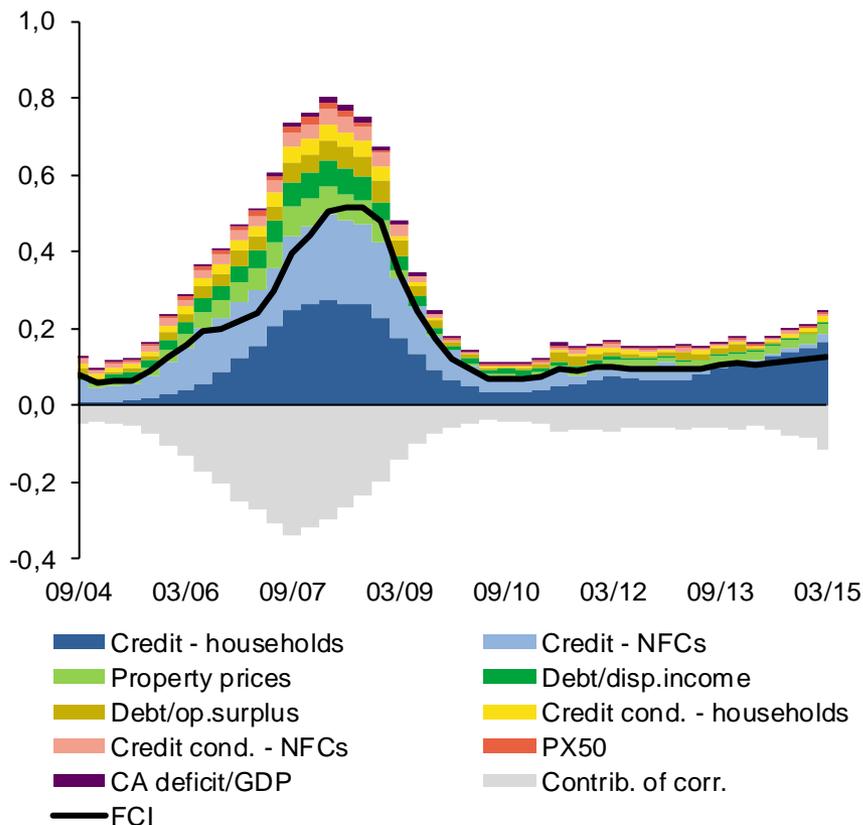


- No FX loans to households, no external funding, high deposit-to-loan ratio, low LTV ratios.

- For detecting the stage in financial cycle and capturing systemic risk build-up we developed the Financial Cycle Indicator (FCI; Plašil et al., 2014).

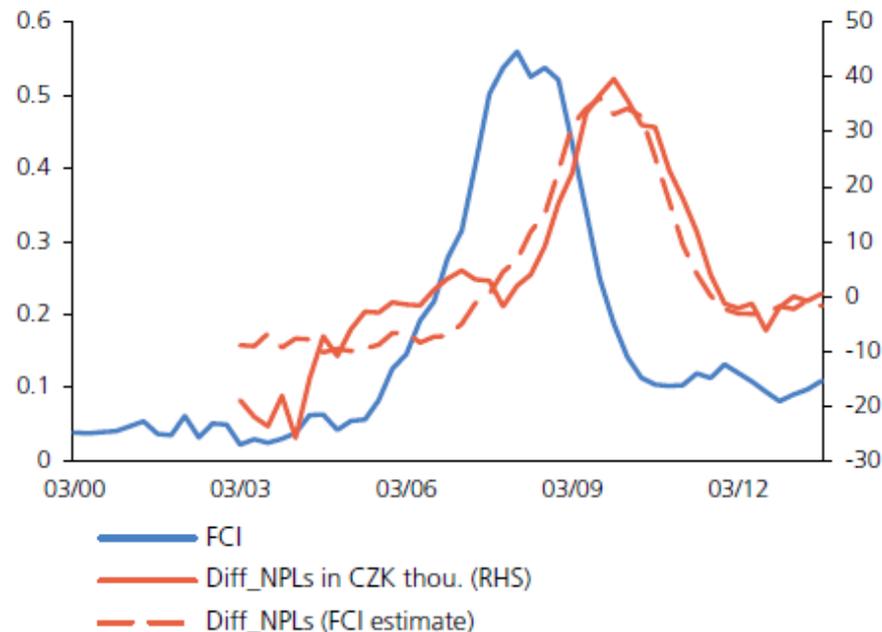
## FCI and its decomposition

(minimum = 0, maximum = 1)



## THE FCI AND RISK MATERIALISATION

(FCI value; right-hand scale: CZK billions)



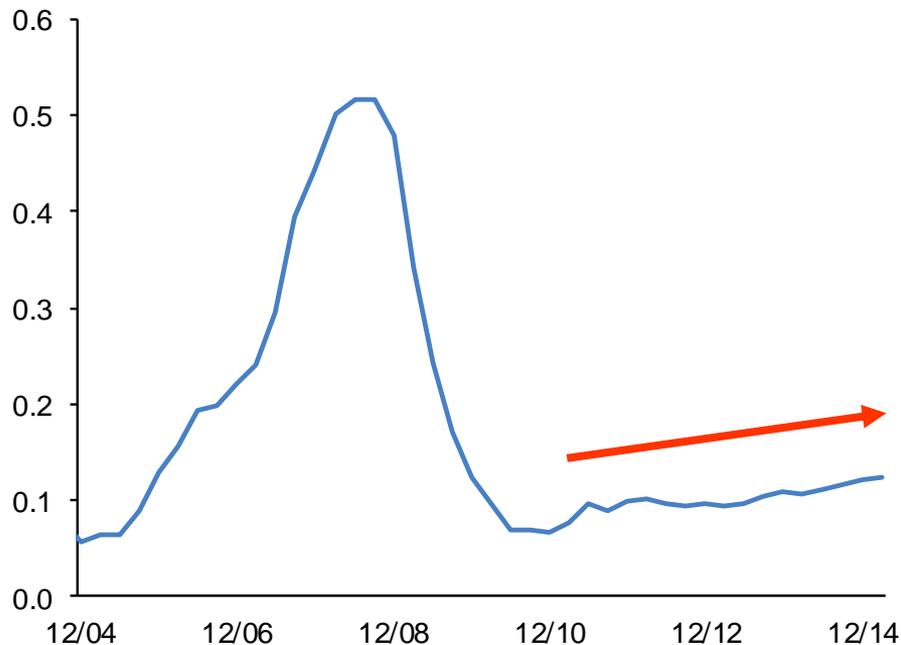
Source: CNB, authors' calculations

- Simple tool (understandable to a wider audience), used also for communication purposes.
- Showing risks related to the financial cycle in their build-up phase, i.e. before they get materialize.
- Comprehensive picture capturing the links between real economy and financial sector.
- May serve as a tool for assessing the need to set the (non-zero) CCB (if credit-to-GDP gap does not serve well).
- FCI follows methodology of the composite indicator of systemic stress:
  - selection of variables is based on the expert judgement but it also reflects existing literature and data availability/quality
  - FCI takes into account mutual correlation of all variables

- The financial cycle in the Czech Republic is in a recovery phase:
  - The aggregate indicator of the financial cycle is rising gradually.
- An easing of banks' lending standards indicates a shift to a more expansionary phase of the cycle.

## Aggregate financial cycle indicator

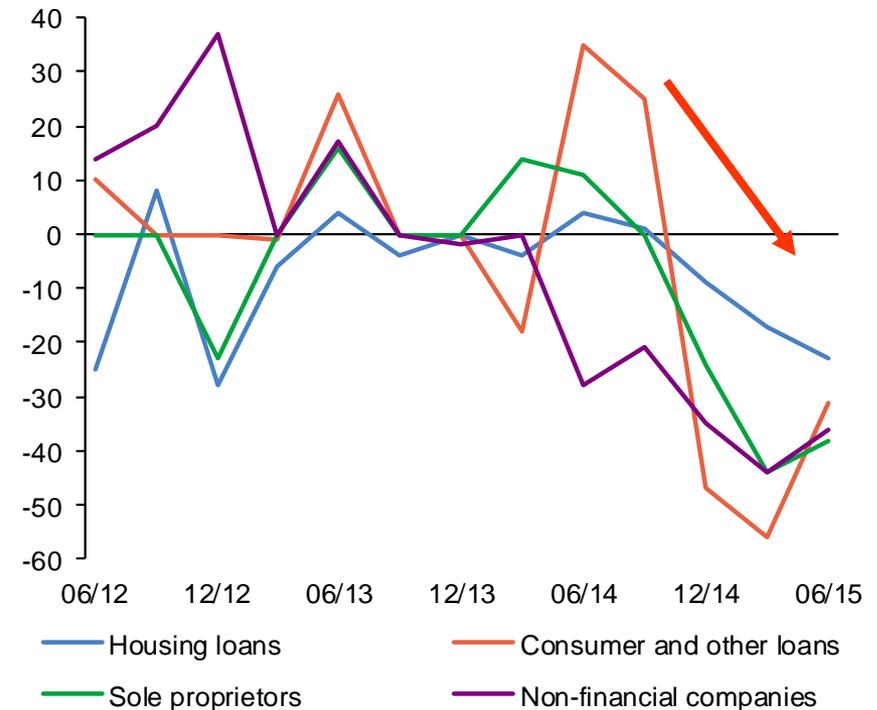
(0 minimum, 1 maximum, end 1Q 2015)



Source: CNB

## General lending standards in the Czech Republic

(difference in market share of banks in pp)

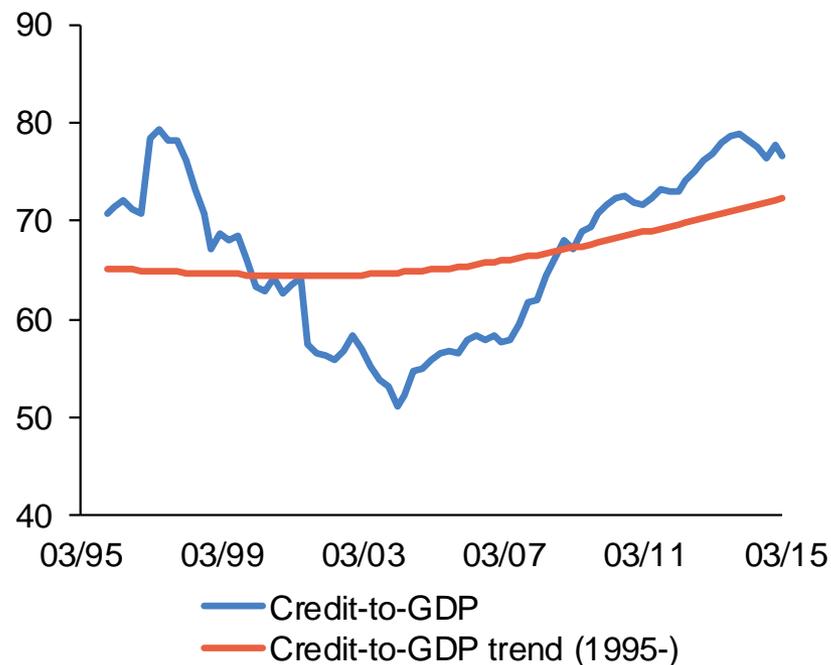


Source: Bank lending survey, CNB

- Credit-to-GDP gap according to common reference guide based on:
  - total credit = all loans provided to the private sector + the volume of bonds issued by the domestic private sector.
  - HP filter with  $\lambda$  of 400,000, time series: 1995 Q4 – latest.

**Credit-to-GDP in the Czech Republic and its trend**

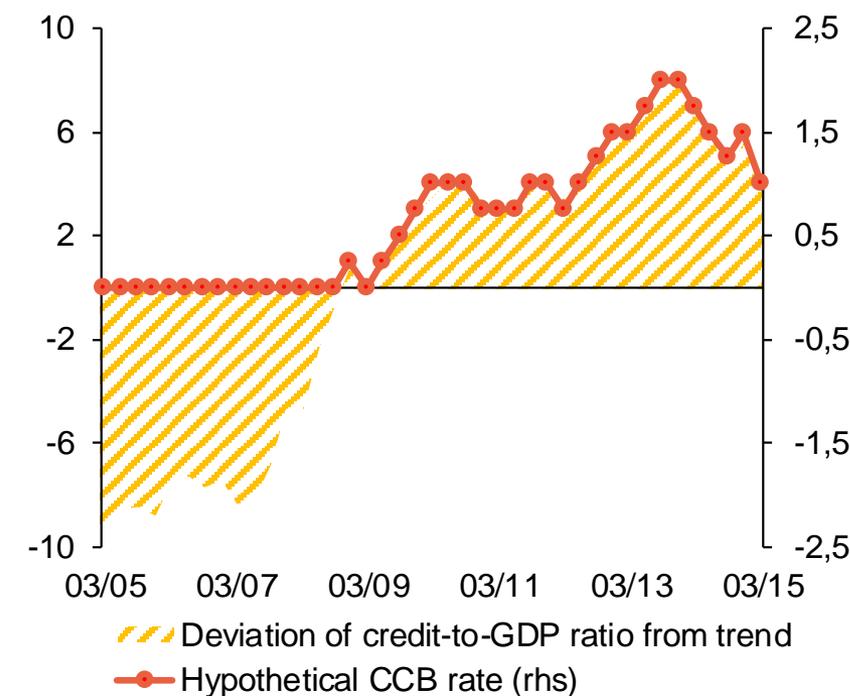
(estimated by HP filter, %)



Source: CNB

**Assessment of the need to set a non-zero CCB rate in the Czech Republic**

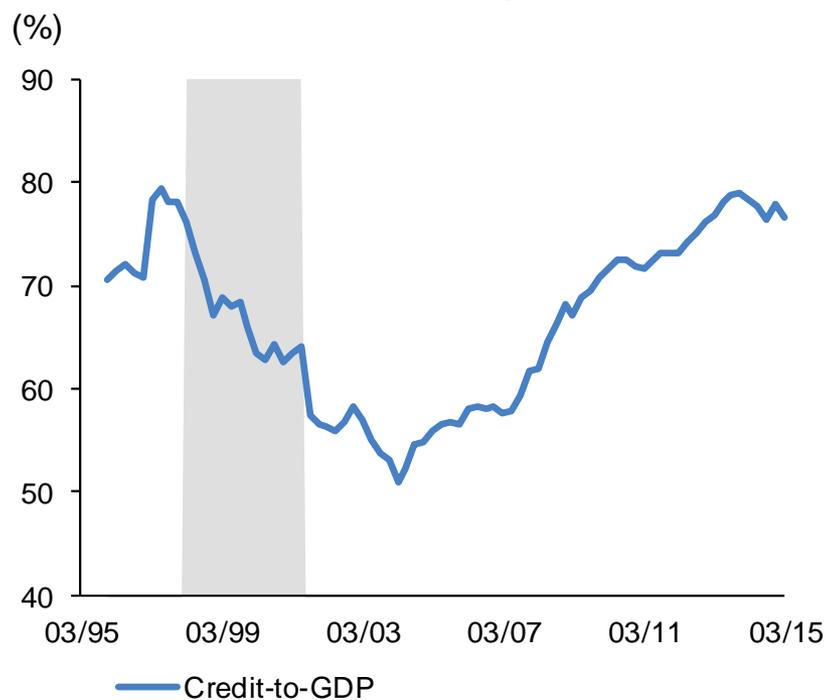
(%)



Source: CNB

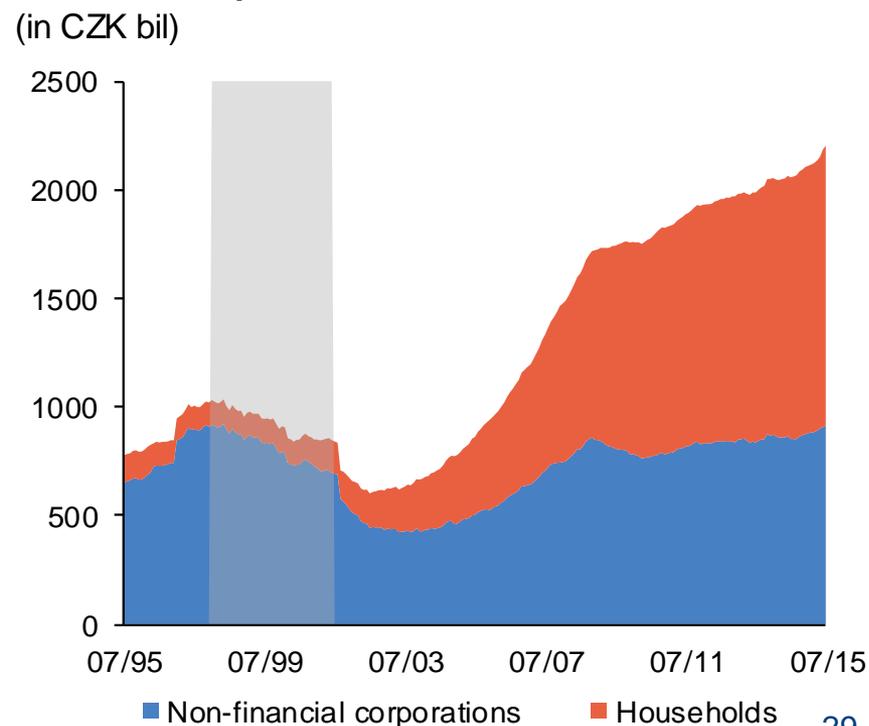
- Banking sector restructuring/deleveraging in late 1990s/early 2000s
  - with write-offs of non-performing loans from banks' balance sheets, bank privatization, etc.
- Changes in the composition of credit to the private sector after 2000 – household/housing credit became dominant.

**Credit-to-GDP in the Czech Republic**



Source: CNB

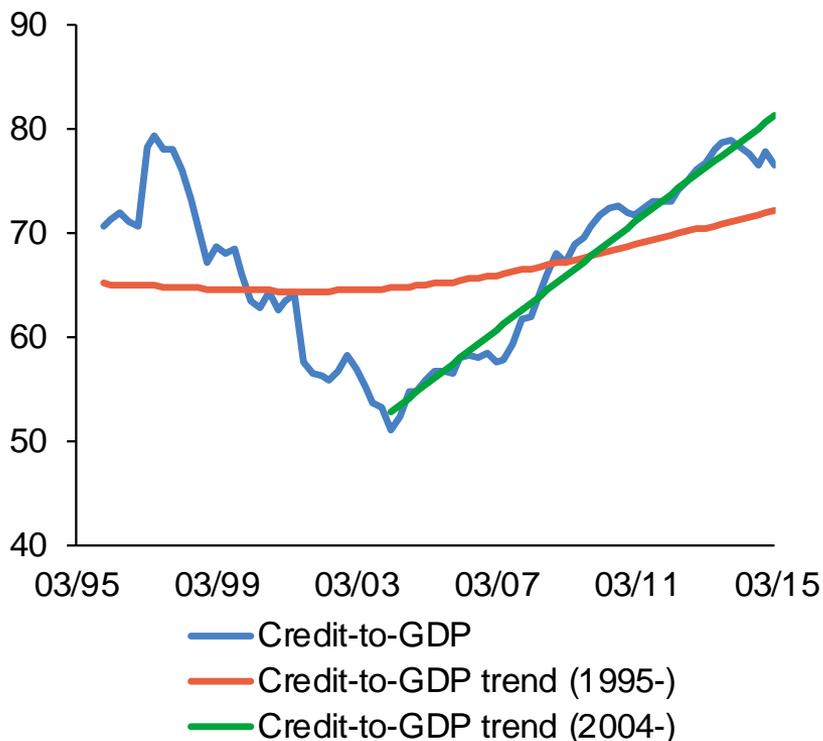
**Stock of bank credit to private non-financial sector in the Czech Republic**



Source: CNB

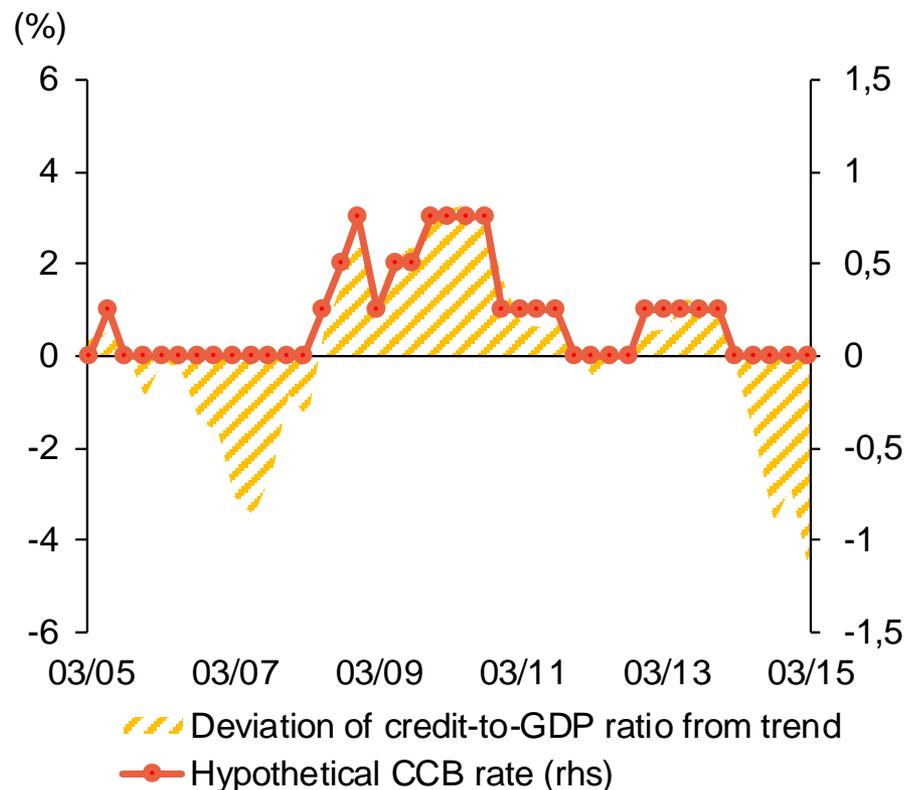
- shorter time series = not including transitional-crisis period,
- time series: 2004 Q1 – latest.

**Credit-to-GDP in the Czech Republic and its trend**  
(estimated by HP filter, %)



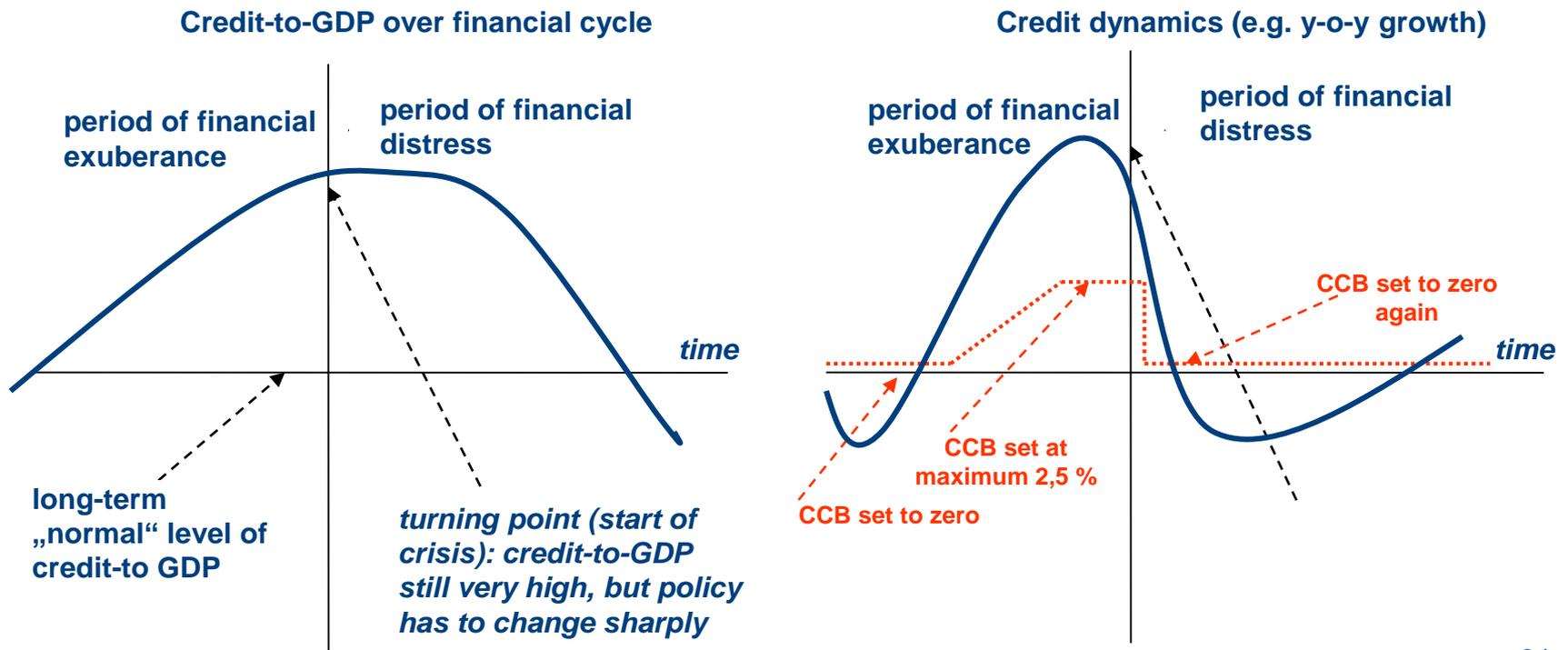
Source: CNB

**Assessment of the need to set a non-zero CCB rate in the Czech Republic**



Source: CNB

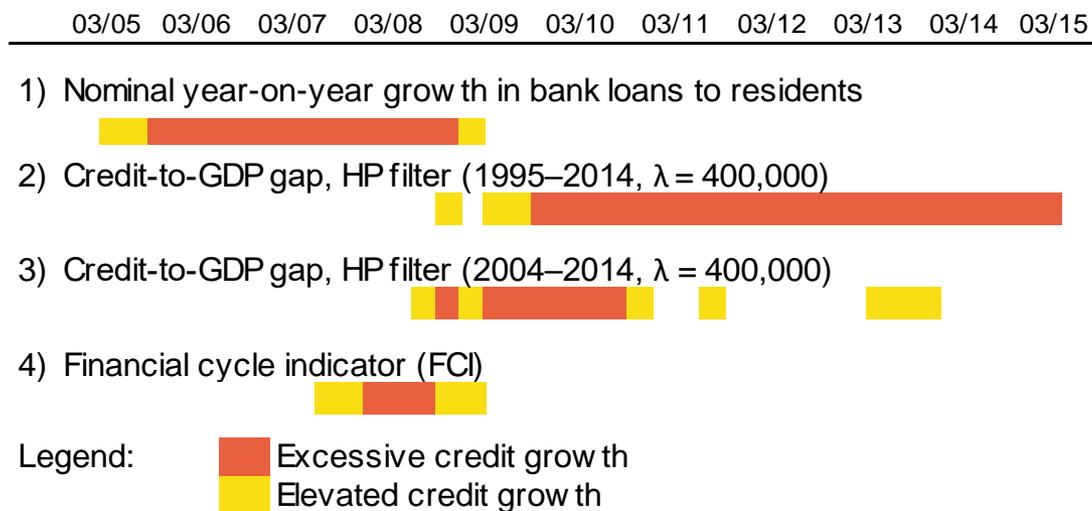
- Credit-to-GDP cannot be a sole driver of the CCB level
  - it is a lagging slow-motion variable staying above the historical norms during the initial stages of crisis.
- Need to guide shifts in setting by using additional indicators of financial cycle and credit dynamics.



- Overall assessment published quarterly as a part of „*Provision on setting the countercyclical capital buffer rate*“.
- Credit-to-GDP gap(s).
- FCI as a composite indicator.
- Group of partial indicators such as
  - bank credit growth,
  - speed of private sector borrowing relative to income,
  - bank lending standards,
  - debt service relative income,
  - residential property prices,
  - capital market dynamics.
- Under construction – linking calibration of the CCB rate to estimates of future losses in banking sector.

- CNB decided at the meeting of its board of 3 September 2015 that **CCB rate** for the Czech Republic shall be set at **0%** of the total risk exposure (app. 01/10/2016).

## Identification of excessive borrowing and accumulation of risks according to various indicators



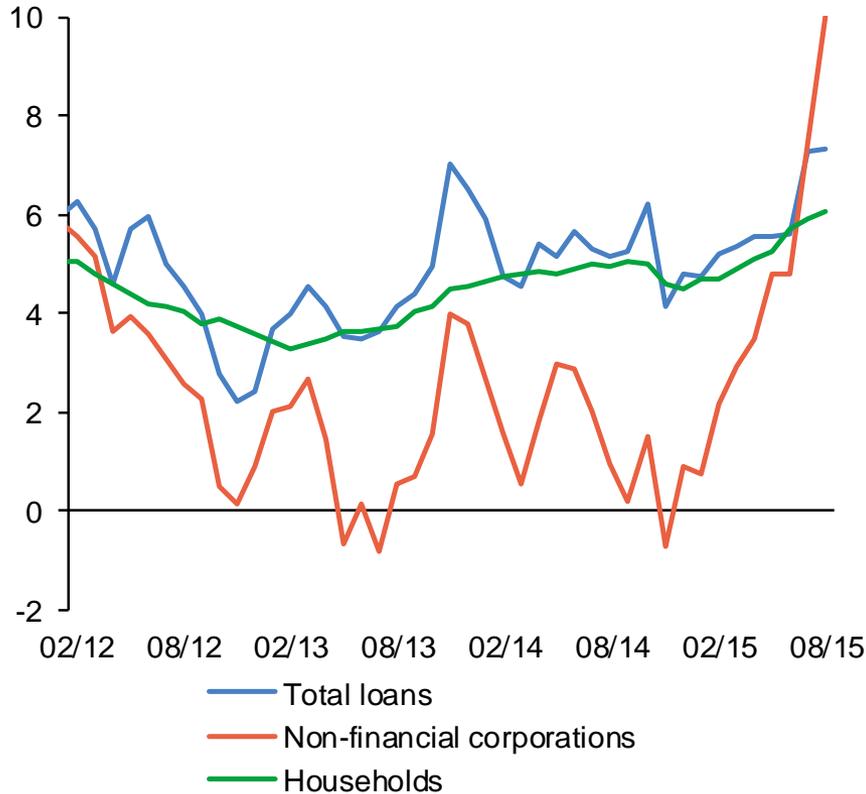
**For indicator 1:** y-o-y growth  $> 10$  pp for elevated growth,  $> 15$  pp for excessive growth. **For indicators 2–3:** credit-to-GDP gap  $> 2$  pp for excessive growth,  $> 0.7$  pp for elevated growth. **For indicator 4:** excessive growth for FCI  $> 0.5$ , elevated growth for FCI  $> 0.3$ .

- Forward guidance provided following every decision on setting CCB rate:
  - latest decision (Q3 2015): *“Given the accelerated credit dynamics, loosening of credit standards and growth in investment sentiment, the probability of a zero CCB rate being set in the next two years has further decreased”*.
  - Decision (Q2 2015): *“:... a zero CCB rate will probably be applied in the next two years as well. However, this probability has decreased as a result of a recovery in credit growth, an easing of bank credit standards and a slight improvement in investment sentiment”*.
  - Decision (Q3 2014): *“:... decided to set the CCB rate for exposures located in the Czech Republic at 0%. Given the current predictions of future credit growth and developments on the relevant markets – the property market in particular – it will probably not be necessary to apply a non-zero CCB rate in the next two years”*.

# Latest bank credit growth figures (August 2015)

## Year-on-year growth rates of a bank loans

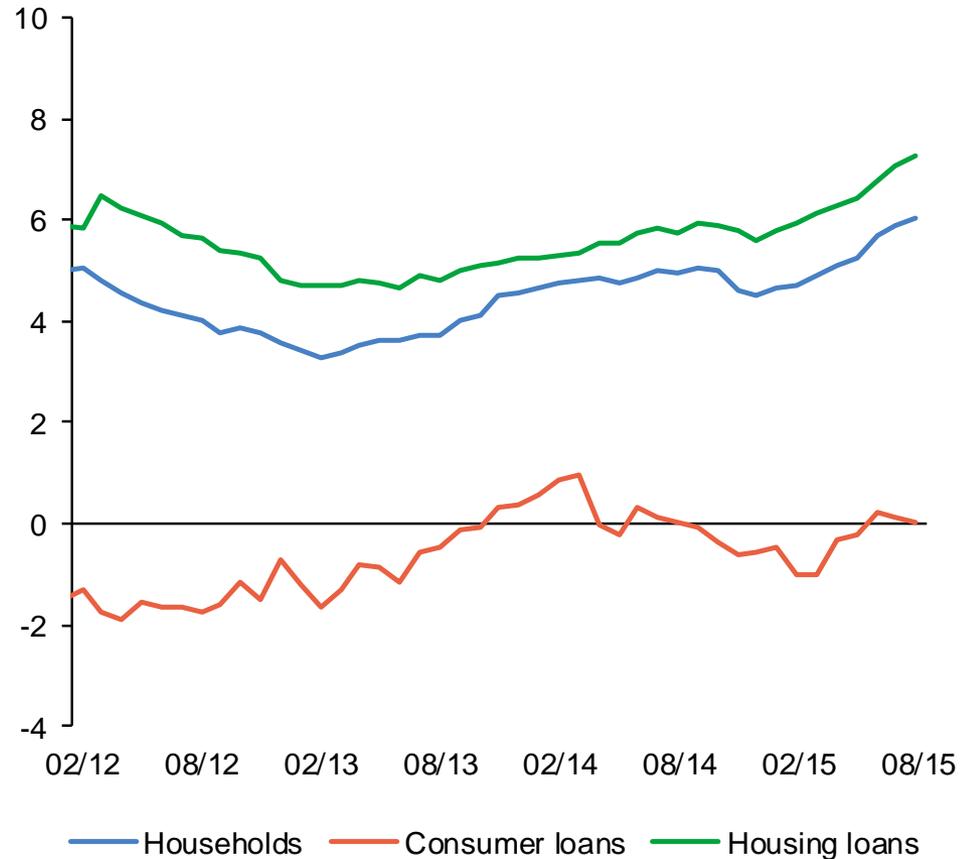
(in %)



Source: CNB

## Year-on-year credit growth to households

(in %)



Source: CNB

# ***IV. Coping with housing exposures' risks***

## The Economist house-price indicators

August 2015 or latest available

	% change		Under (-)/over (+) valued*, %, against:	
	on a year earlier	Since Q1 2012	Rents	Income <sup>†</sup>
Hong Kong	20.8	61.4	89	na
Turkey	18.8	56.0	20	na
Ireland	13.4	23.2	29	3
Sweden	10.3	21.5	47	29
Australia	7.5	23.4	63	43
South Africa	7.3	29.1	12	7
India	6.4	18.3	na	na
Mexico	6.4	14.9	13	na
Russia	5.1	13.8	na	-21
Britain	4.7	24.9	47	27
Canada	4.7	14.2	89	34
United States	4.7	30.0	10	-6
Germany	4.6	14.9	-9	-10

Brazil	4.5	35.0	na	na
Israel	4.0	22.5	11	na
South Korea	2.9	3.6	3	-39
Netherlands	2.5	-6.8	2	15
Switzerland	2.2	9.0	2	-7
Japan	2.2	4.7	-27	-30
Spain	1.6	-14.3	12	5
Belgium	0.7	2.9	54	46
France	-2.3	-6.0	28	22
China	-2.4	4.6	25	-49
Italy	-3.3	-13.6	-6	3
Singapore	-3.7	-2.0	17	na
Greece	-5.9	-25.6	-18	-17

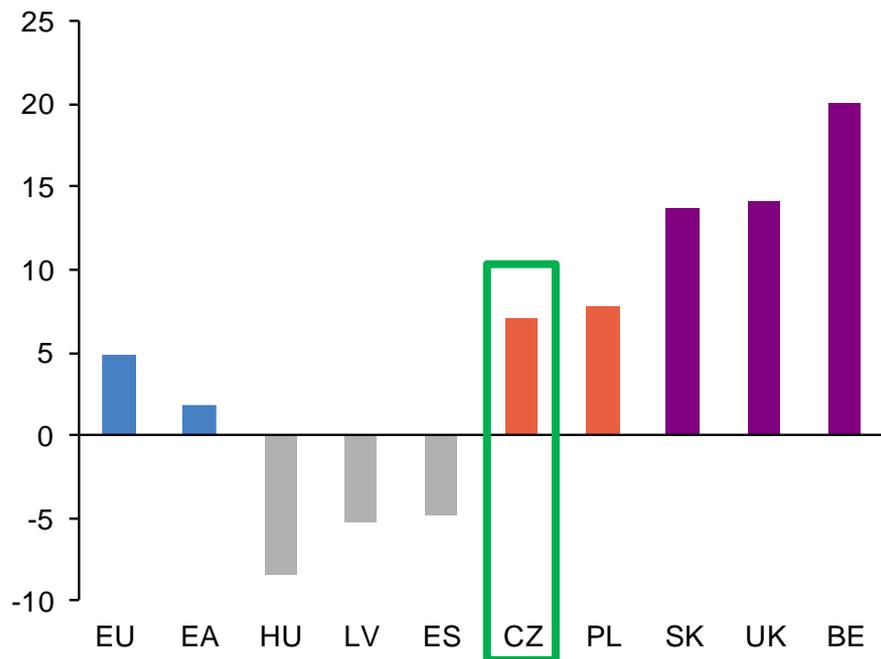
Sources: Haver Analytics; OECD;  
Thomson Reuters; national  
statistics offices; *The Economist*

\*Relative to long-run  
average †Disposable  
income per person

Economist.com

Economist: Global housing markets: Upwardly  
mobile, 3 October 2015

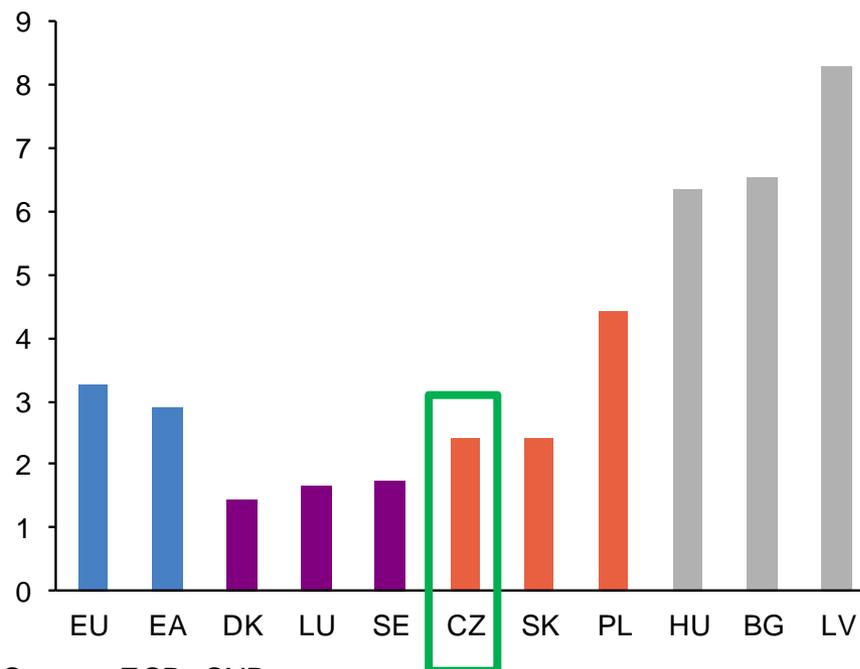
**Year-on-year rate of growth of housing loans**  
(August 2015, %)



Source: ECB, CNB

Note: Loans to residents in all currencies. Three month average as of August 2015.

**Interest rates on new housing loans**  
(August 2015, % p.a.)

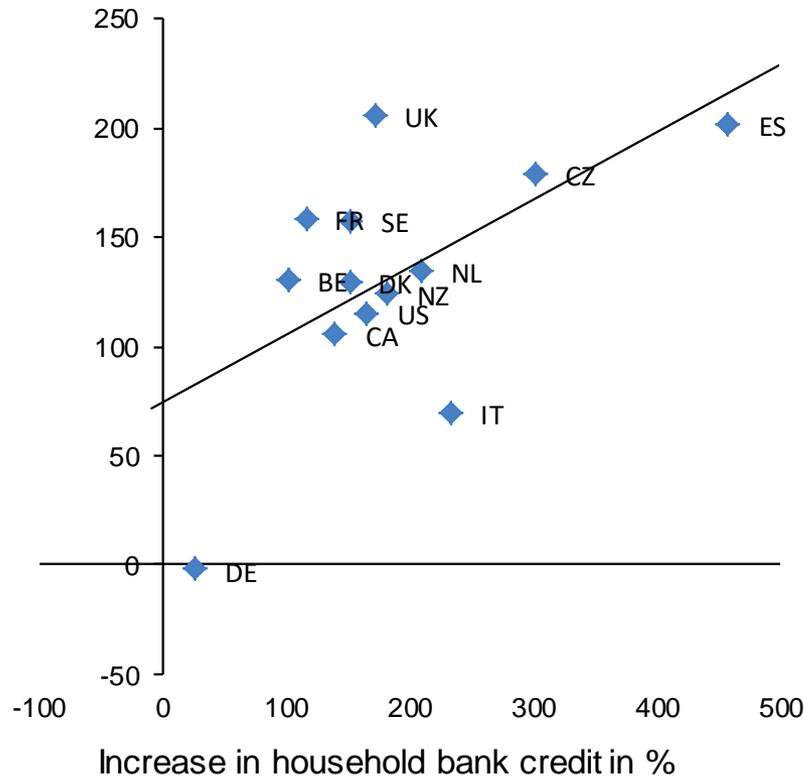


Source: ECB, CNB

Note: Interest rates on new loans with fixation of 1 to 5 years in domestic currency as of August 2015.

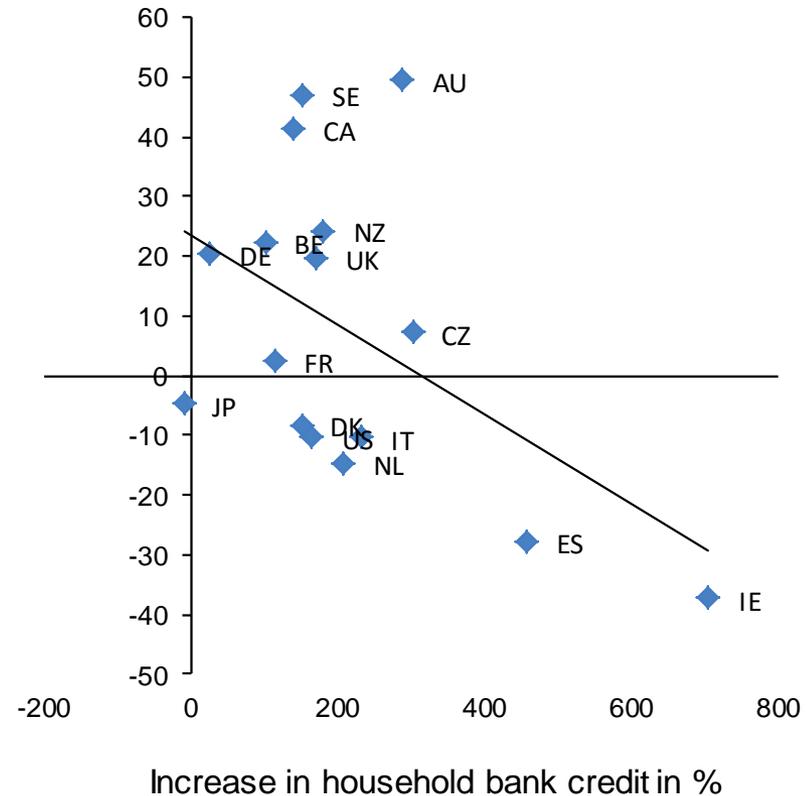
- Fast credit growth may have significantly different effects on real estate prices in the short- and long-run horizon.

**Change in credit and real estate prices 1997 - 2007**  
(vertical axis: Increase in real estate prices in %)



Sourcej: BIS, national central banks.

**Change in credit before 2007 and real estate prices after 2007**  
(vertical axis: Increase in real estate prices in %)

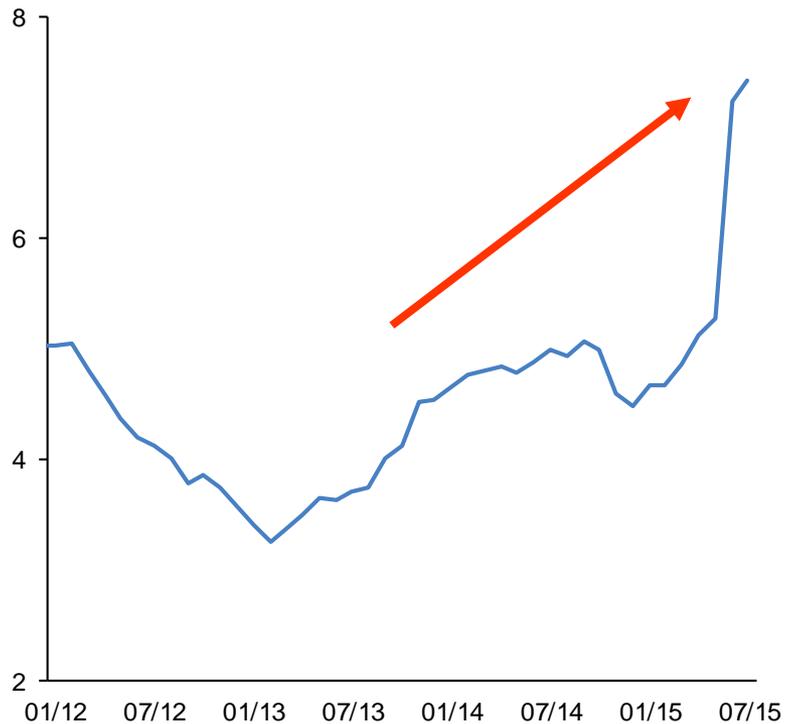


Sourcej: BIS, national central banks.

- Faster growth in new loans for house purchase.
- Interest rates on new loans for house purchase falling.

Year-on-year of housing credit growth

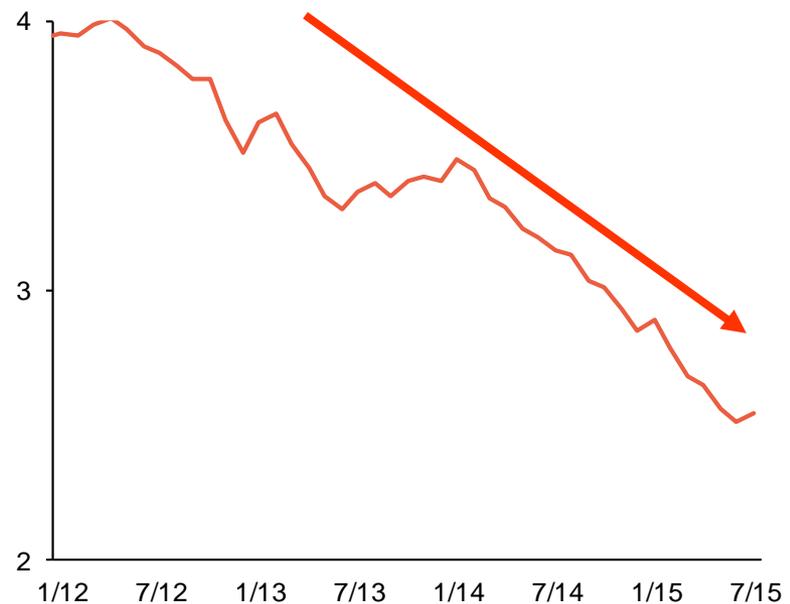
(in %)



Source: CNB

New CZK housing loans interest rates

(in %)

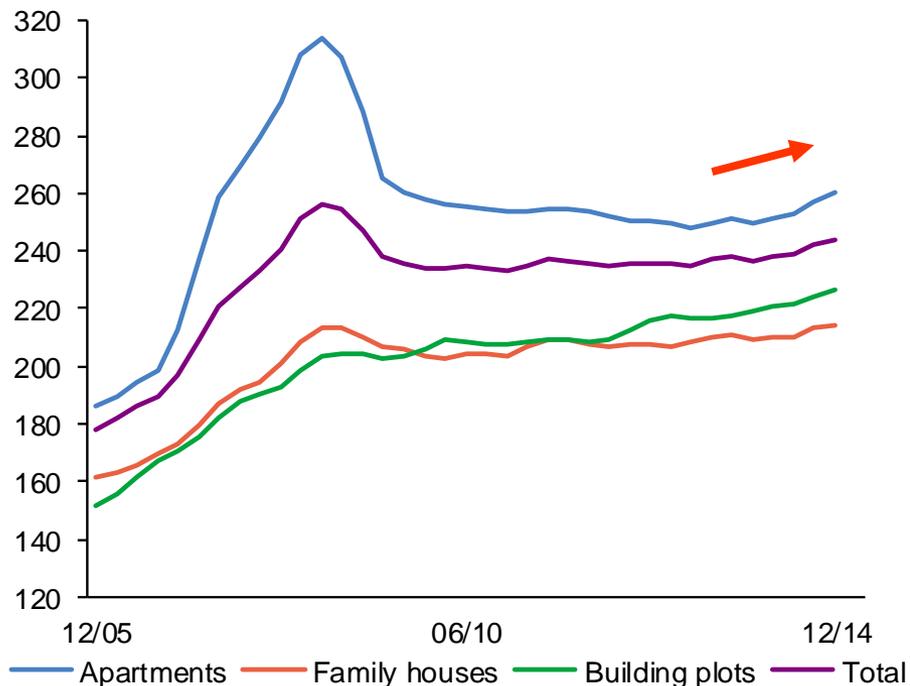


Source: CNB

- Residential property prices increased in 2014.
- The number of apartment starts rose as well.

## Property prices – transaction prices

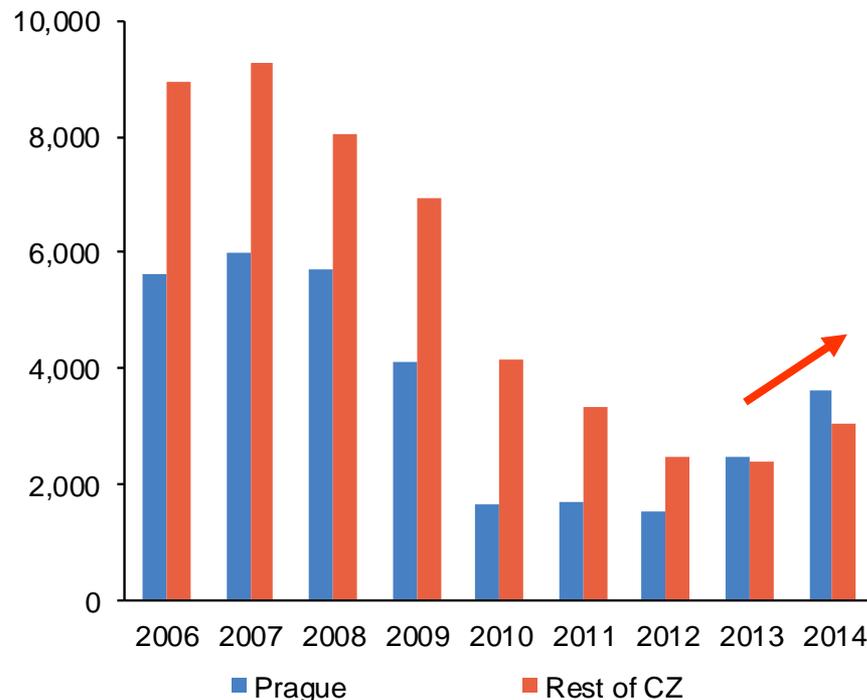
(1999 Q1 = 100)



Source: CZSO, HB index, CNB calculation

Note: The data for family houses and apartments for 2014 H1 are preliminary. The other data for 2014 are calculated from alternative sources of data on transaction prices (the HB index and transaction prices of apartments from a CZSO survey).

## Numbers of apartment starts

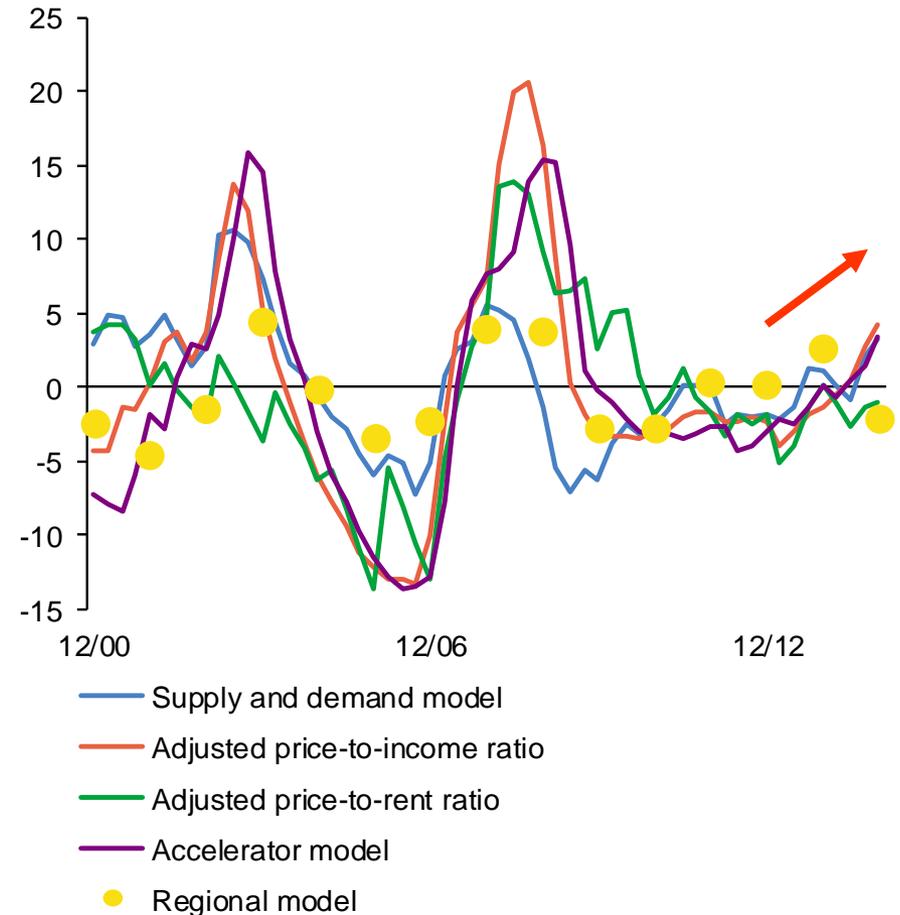


Source: CNB, CZSO

Note: Numbers of apartment starts in apartment blocks only.

- The risk of residential property prices becoming significantly overvalued is low for now.
- The new formalised CNB approach combines four statistical and econometric models:
- overall, it indicates slight overvaluation of apartment prices of 2.5%,
- however, there is a strong regional dimension (prices in Prague and Brno are most overvalued).

**Apartment price gaps according to various methods**  
(%; positive values indicate overvaluation, negative values undervaluation)

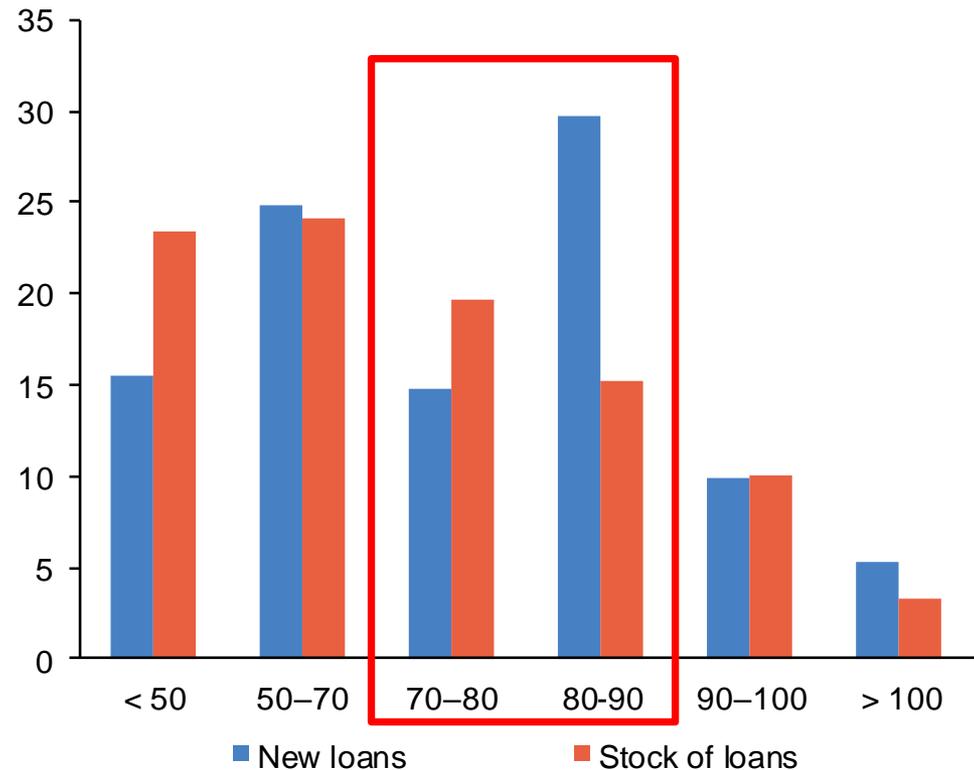


- Sustained growth in property prices becomes a risk to financial stability if it is accompanied by an easing of lending standards.
- To assess the degree of easing of credit standards, the CNB conducted a survey among banks regarding the structure of new loans provided in 2014 according to two indicator categories:
  - LTV (loan-to-value) – the ratio of the loan amount to the value of collateral,
  - LTI (loan-to-income) – the ratio of the loan amount to the applicant's net income.

- The LTV distribution of new loans differs partly from the distribution of the stock of loans.
- Loans with LTVs between 80% and 90% were the most frequent among the monitored categories of new loans.
- A skewed distribution is visible for new loans: average LTV 63%, median LTV 77%.

## Comparison of the LTV distribution of new loans and the stock of loans

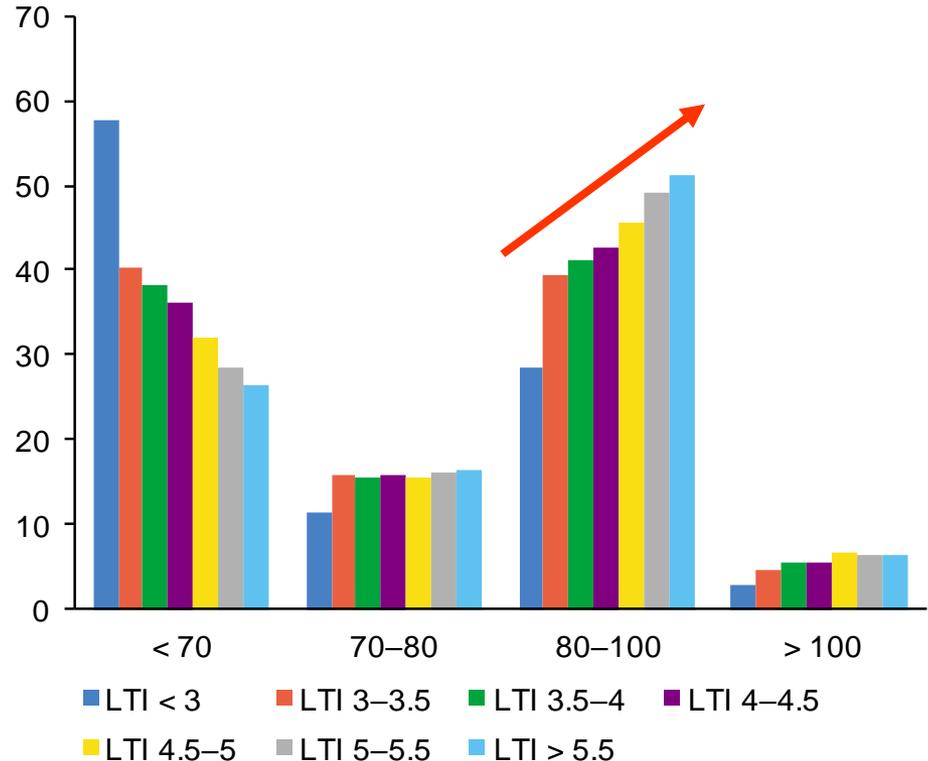
(x-axis: LTV in %; y-axis: share of loans in %)



Source: CNB

- The LTI distribution of new loans is U-shaped.
  - Loans with very low ( $< 3$ ) or very high ( $> 5.5$ ) LTIs are the most frequent.
- There is a risky positive relationship between LTI and LTV.
  - Loans with high LTVs do not always have low LTIs (are not drawn only by people with high income).
  - By contrast, a rising LTI also means a rising share of loans with LTVs of 80%–100% and a higher average loan amount.

**Relationship between LTV and LTI for new loans**  
(x-axis: LTV in %; y-axis: share of loans in %)



Source: CNB

- The recommendation takes the form of a set of interconnected sub-recommendations (quantitative and qualitative) for banks, foreign bank branches and credit unions.
  - Credit institutions operating in the Czech Republic are mostly prudent when providing loans secured by residential property.
  - However, there are signs of some easing of lending standards in this segment.
- The recommendation aims to prevent a loop between property price growth and growth in loans posing a threat to the sector's stability.
  - The individual recommendations define correct lending procedures and standards.
  - They are aimed at enhancing existing internal risk management systems in institutions and encouraging a prudent approach to lending.

- Number of European countries moved to using LTV restrictions in recent years.

## LTV limit (/maximum share of loans with higher LTV)

Post-transitional	Standard	First time buyers	Buy to let housing	Implementation
CZ	90% / 10%, 100%			2015
EE	85% / 15%			2015
HU	80%			2015
SK	90% / 10%*, 100%			2014
PO	90%			2014
LT	85%			2011
RO	85%			2011
LV	90%			2007
<b>Other</b>				
NO	85% / 10%			2015
IE	80% / 15%	90% / 15%	70% / 10%	2015
SE	85%			2010
FI	90%	95%		2016

Source: <https://www.esrb.europa.eu/mppa/html/index.en.html>

\* Incrementally from 90% / 25% in 2015 to 90% / 10% in 2017.

- Authorities in some countries combine LTV restrictions with ones applied to debt-to-income and debt service-to income ratios (LTI, DSTI).
- Some also focus on increasing capital requirements through the CCB or risk-weighting tools.

Limit (/maximum share of loans with higher level of indicator)

Post-transitional	LTV	LTI	DSTI	Implementation
EE	85% / 15%		50% / 15%	2015
LT	85%		40%	2011
<b>Other</b>				
IE	80% / 15%	3,5 / 20%		2015
FI	90%		50% / 15%	2015
UK		4,5 / 15%		2014

Source: <https://www.esrb.europa.eu/mppa/html/index.en.html>

- The objective of macroprudential policy cannot be to sweep any risk out of financial system.
  - It can only be to build some barriers against the occasions when firms and households take on risks that they are not able to identify or price correctly owing to wide-spread exuberance.
  - Paradox of financial instability sets clear limits for central bankers too – the push for undue stability may produce destabilizing effects in the long run.
- The central bankers may not be able to prevent from any financial upswings and imbalances.
  - They can and set boundaries for prospective damages through applying counter-cyclical tools.
- Being forward-looking and responsive to prospective risks is a key to success in conduct of macroprudential policy.
  - Hope is not the strategy.

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