ESRB
European Systemic Risk Board
European System of Financial Supervision

EUROPEAN CENTRAL BANK
EUROSYSTEM

Macroprudential Policy Implementation in Europe

Session 5: Macroprudential analysis of the real estate sector

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17-19 October 2018

Overview

1. Importance of real estate markets for financial stability and the real economy
2. Residential and commercial real estate
3. Macroprudential analysis for residential real estate markets
    1. Risk analysis
    2. Policy analysis
4. Conclusions

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Importance of RE markets for financial stability and the real economy

- **Large costs of housing bubble bursts (Claessens et al. 2009; Crowe et al. 2013; Cerutti et al. 2015)**

	Median values			Mean values		
	Without busts	With busts	With severe busts	Without busts	With busts	With severe busts
A. Output						
Duration[a]	3.00	3.00	3.00	3.18	4.55**	4.6**
Amplitude	−1.51	−2.2*	−2.64**	−1.96	−3.24*	−4.05**
Cumulative loss	−2.24	−3.84***	−5.23***	−3.48	−10.68**	−13.90*
B. Components of output						
Consumption	0.05	−0.76***	−1.16***	0.13	−1.71***	−2.25***
Total investment	−3.82	−7.77*	−6.92	−4.59	−9.48**	−9.59
Residential investment	−2.46	−6.79**	−7.47**	−4.63	−11.31**	−13.65**
Non-residential investment	−3.67	−7.7*	−6.82	−4.06	−8.84*	−7.83
Exports	−1.07	0.68*	0.67	−1.02	1.03*	1.20
Imports	−2.65	−5.23	−5.3*	−2.24	−5.26*	−6.13**
Net export (% of GDP)[b]	0.41	1.24***	1.29**	0.09	1.5***	1.48**
Current account (% of GDP)[b]	0.07	0.78**	0.6*	0.02	1.27**	1.23*
C. Other macroeconomic variables						
Industrial production	−4.43	−4.26	−4.99	−4.13	−4.35	−4.73
Unemployment rate[b]	0.47	1.36***	1.2***	0.83	2.02**	1.93
Inflation rate[b]	−0.26	−0.80	−0.59	−0.35	−0.88	−0.14
D. Financial variables						
House prices	−0.84	−6.3***	−7.05***	−0.34	−9.63***	−11.17***
Equity prices	−8.85	0.61*	−7.22	−6.87	0.06	−1.59
Credit	1.42	−0.52***	−1.24***	3.01	−2.37***	−2.99***

Notes: Severe house price busts are those in the top half of all bust episodes. Each cell reports the mean (median) change in the respective variable from peak to trough of recessions associated with house price busts, unless otherwise indicated. The symbols *, **, and *** indicate that the difference between means (medians) of recessions with and without house price busts is significant at the 10%, 5%, and 1% levels, respectively.

[a]Number of quarters.

[b]Change in levels.

Importance of RE markets for financial stability and the real economy

Events	Duration[a] (mean)	Amplitude (median)	Total investment (median)	Residential investment (median)	Non-residential investment (median)	Unemployment[b] (median)
A. Credit contractions	5.52	−4.08	−0.79	−1.77	0.05	0.48
Credit crunches	10.29***	−13.26***	−6.13***	−6.37***	0.09	1.76***
Other credit contractions	3.95	−3.20	−0.17	−1.13	0.02	0.22
B. House price declines	8.47	−5.99	0.72	−4.08	2.00	0.50
House price busts	18.14***	−28.52***	−8.36***	−11.55***	−7.79**	2.8***
Other house price declines	5.33	−4.14	2.22	−0.96	2.64	0.23
C. Equity price declines	6.64	−23.70	3.67	2.96	4.17	0.05
Equity price busts	11.79***	−50.62***	0.67*	3.04	2.79	0.7***
Other equity price declines	4.93	−19.20	3.99	2.94	4.42	−0.04

Notes: Credit crunches and asset price busts correspond to peak-to-trough declines in credit and asset prices that are in the top 25% of all episodes of credit contractions and asset price declines, respectively. In each cell, the mean (median) change in the respective variable from peak to trough of the episodes of credit declines/crunches, house price declines/busts, and equity price declines/busts is reported, unless otherwise indicated. The symbols *, **, and *** indicate that the difference between means (medians) of crunches/busts and other contractions/declines is significant at the 10%, 5%, and 1% levels, respectively.

[a]Number of quarters.

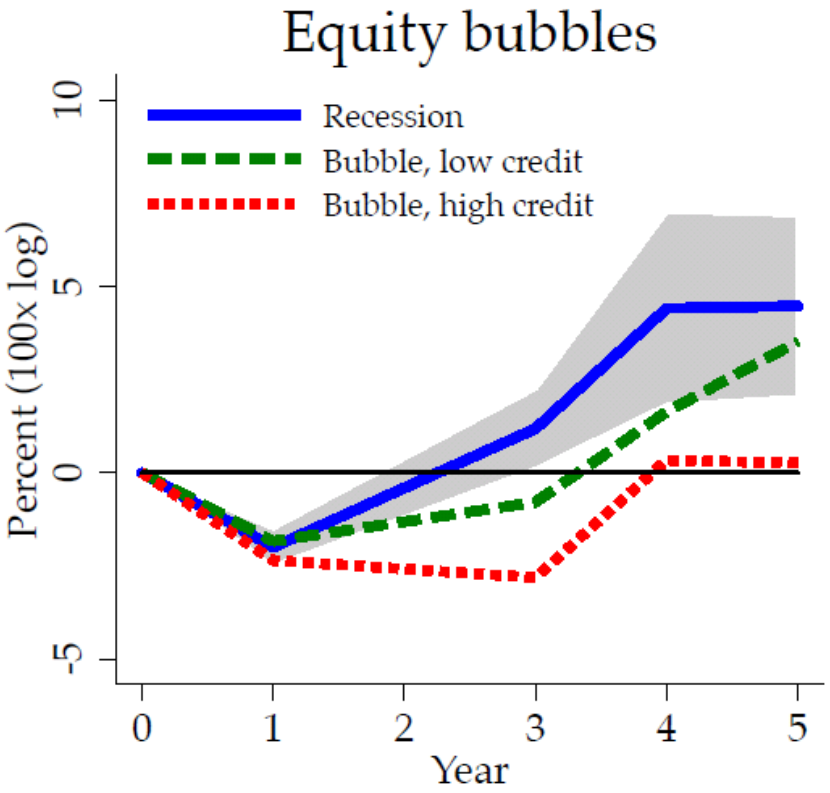
[b]Change in levels.

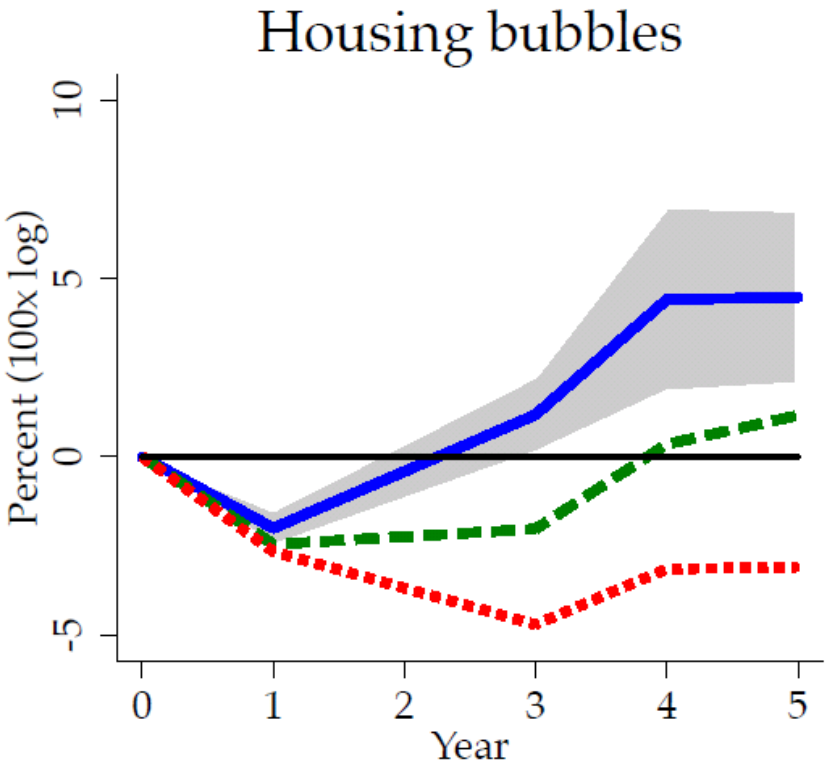
Source: Claessens, Kose, Terrones, 2009, What Happens During Recessions, Crunches and Busts? Economic Policy, Vol. 24, No. 60

Importance of RE markets for financial stability and the real economy

Equity and housing bubbles with and without credit:

⇒ Credit-financed house price bubbles are the most costly and have long lasting impact





Source: Jordà, Schularick, Taylor (2015)

Notes Year zero denotes the peak of GDP (start of the recession).

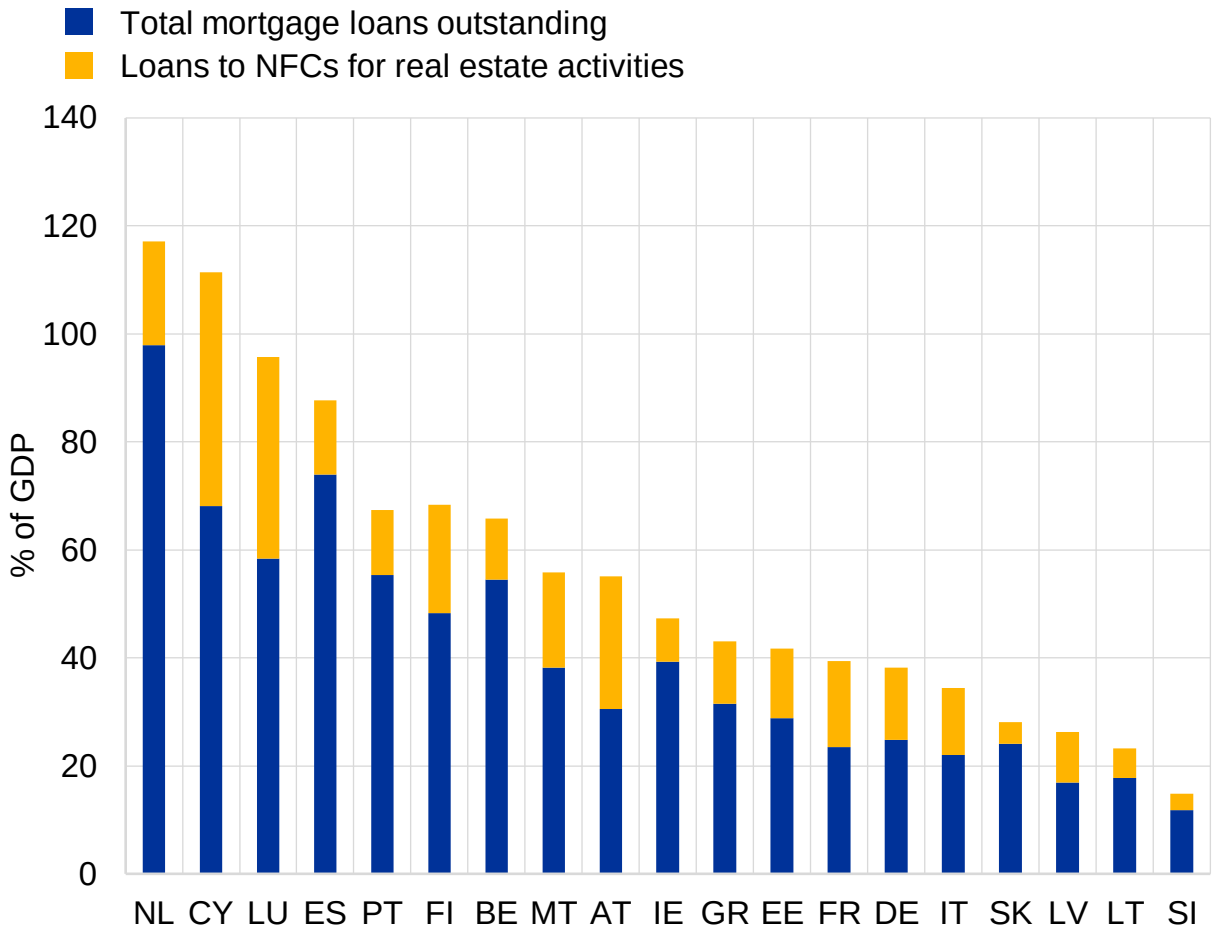
Importance of RE markets for financial stability and the real economy

- **Real estate purchases are largely financed by debt**
  - Leverage ratios of home buyers are higher than in any other investment activity
    - A typical mortgage loan carries a loan-to-value ratio of 71 percent on average across a global sample of countries (Crowe et al. 2013)
  - Relatively limited resilience to shocks compared to other sectors
- **Links between housing, real economy and financial stability:**
  - Large exposures of banks to RE markets
  - Wealth effects
  - Collateral channel
  - Indirect effects on the business cycle and financial stability

Importance of RE markets: Bank exposures

- **Direct exposures**
  - Mortgage loans to households
  - Loans to firms active in the real estate sector
  - Holdings of securitized real estate loans (mortgages and others)
  - Holdings of shares of real estate investment funds
  - Holdings of bonds issued by firms active in the real estate sector
- **Complications:**
  - Data coverage not complete across banks and countries
  - Banks are exposed to domestic and foreign RE markets

Importance of RE markets: Bank exposures



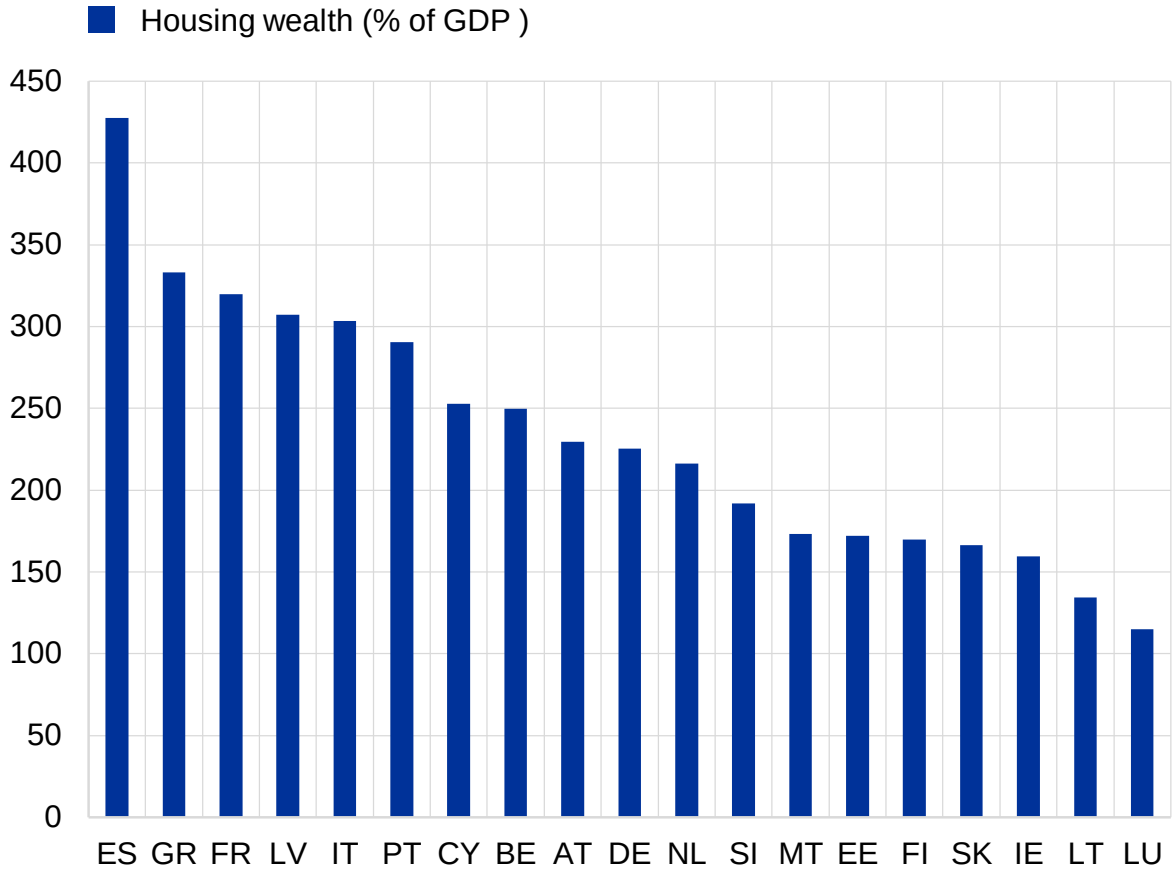
Sources: ECB

Note: Reference period: Total mortgage loans outstanding - Q1 2018, Loans to NFC – Q4 2017

- **Note: Exposures of banks are also large in relation to bank capital in some countries**

Importance of RE markets: Wealth effects

- Real estate is the most important form of storage of wealth across countries (financial assets play a smaller role, especially in Europe)



Importance of RE markets: Wealth effects

Estimates of housing wealth effects using macro and micro data

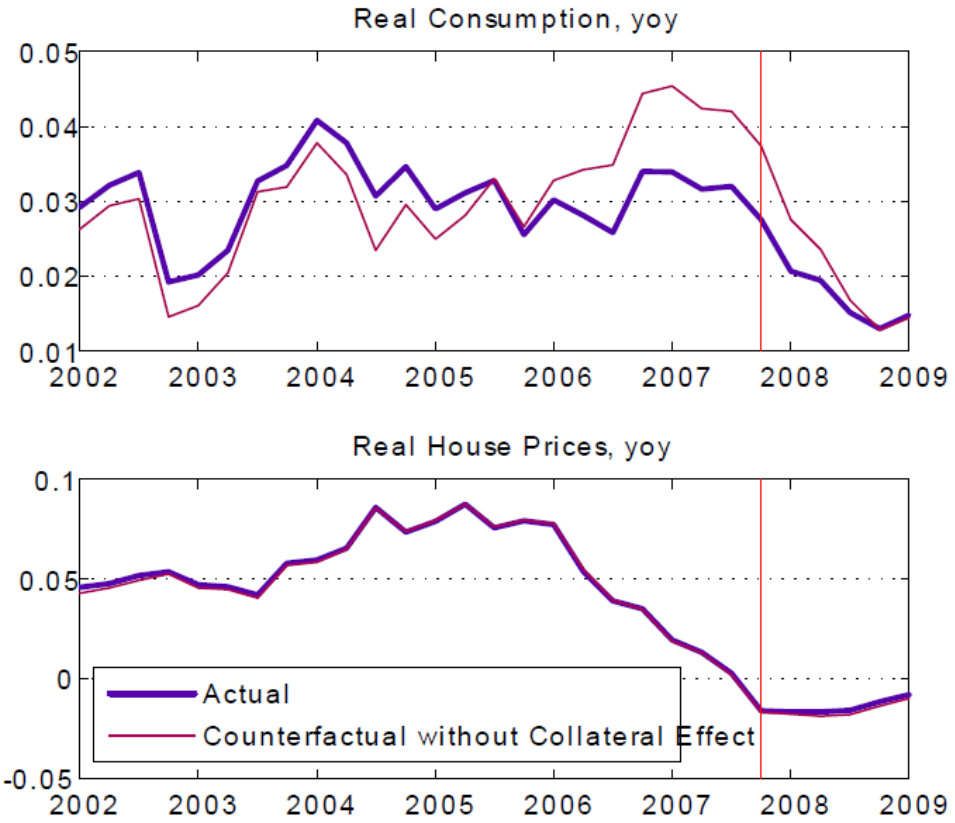
(marginal propensity to consume out of one unit of local currency of housing wealth)

	US	CAN	UK	OECD	FR	IT	FI	ES	euro area
Macro data									
Marginal propensities to consume									
Bassanetti and Zollino (2008)						0.01-0.02			
Bertaut (2002)	0.10	0.09	0.04						
Carroll, Otsuka and Slacalek (2006)	0.06								
Skinner (1993)	0.06								
Slacalek (2006)	0.05	0.05	0.05	0.01					0
Elasticities									
Boone and Girouard (2002)	0.03	0.19	0.04		0.05	-0.06			
Case, Quigley and Shiller (2005)	0.03-0.10			0.09-0.17					
Ludwig and Sløk (2004)				0.04					
Micro data									
Marginal propensities to consume									
Bover (2006)								0.02-0.07	
Campbell and Cocco (2007)			0.08						
Guiso, Paiella and Visco (2005)						0.02			
Lehnert (2004)	0.02								
Paiella (2004)						0.02			
Elasticities									
Bostic et al. (2006)	0.06								
Grant and Peltonen (2008)						0.8			
Sierminska and Takhtamanova (2007)		0.12				0.13	0.10		

Source: ECB (2009): Housing wealth and private consumption in the euro area, January 2009

Importance of RE markets: Collateral channel

- **Real estate assets key form of collateral**
  - Changes in real estate prices affect borrowing constraints (financial accelerator mechanism) which in turns affect borrowing capacity, consumption and investment (relevant for household and firms)



Source: Jacoviello M., 2008, Lessons from the Recent Housing Market Cycle, IMF Roundtable Discussion on Housing.

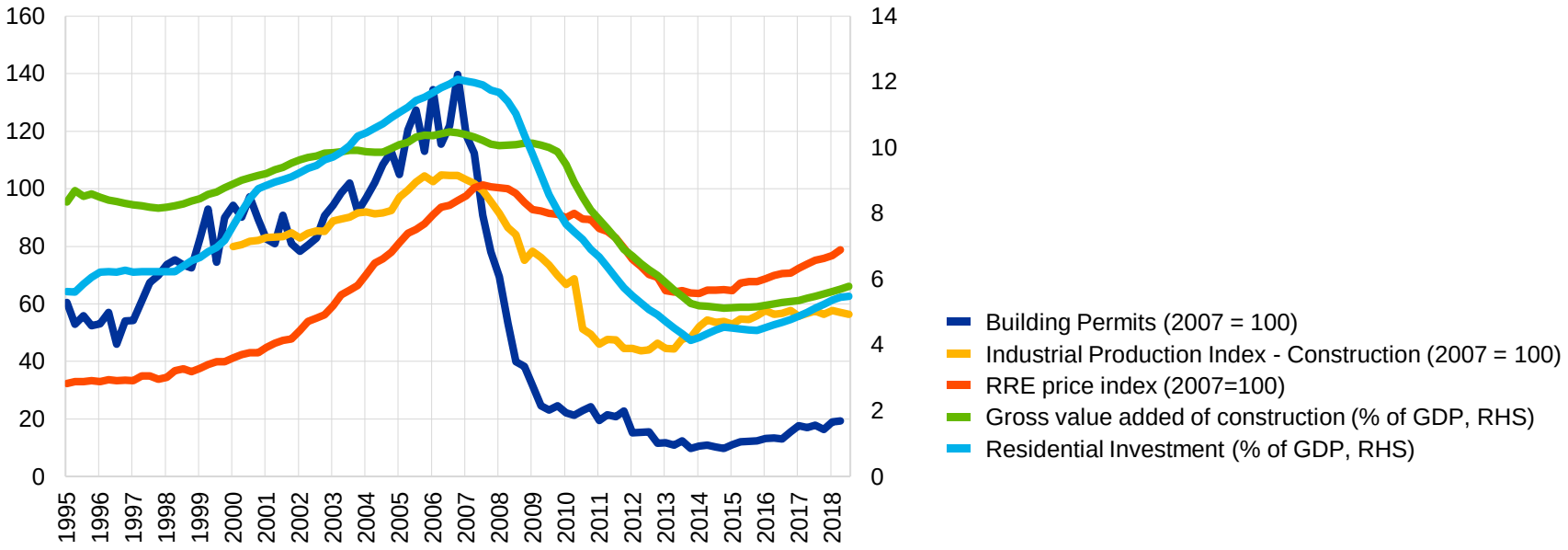
Example for the US:

- The Housing Boom in the US kept consumption growth strong;
- The housing Bust dragged consumption growth down (-0.8% p.a. in 2006 and 2007)

Importance of RE markets: Spillovers

- **Spillovers to the real economy:**
  Housing ⇒ construction activity and investment in RE
  ⇒ share of RE in valued added and employment
  ⇒ overall consumption investment
  ⇒ overall credit risk in the economy

Developments in Spain



Source: ECB

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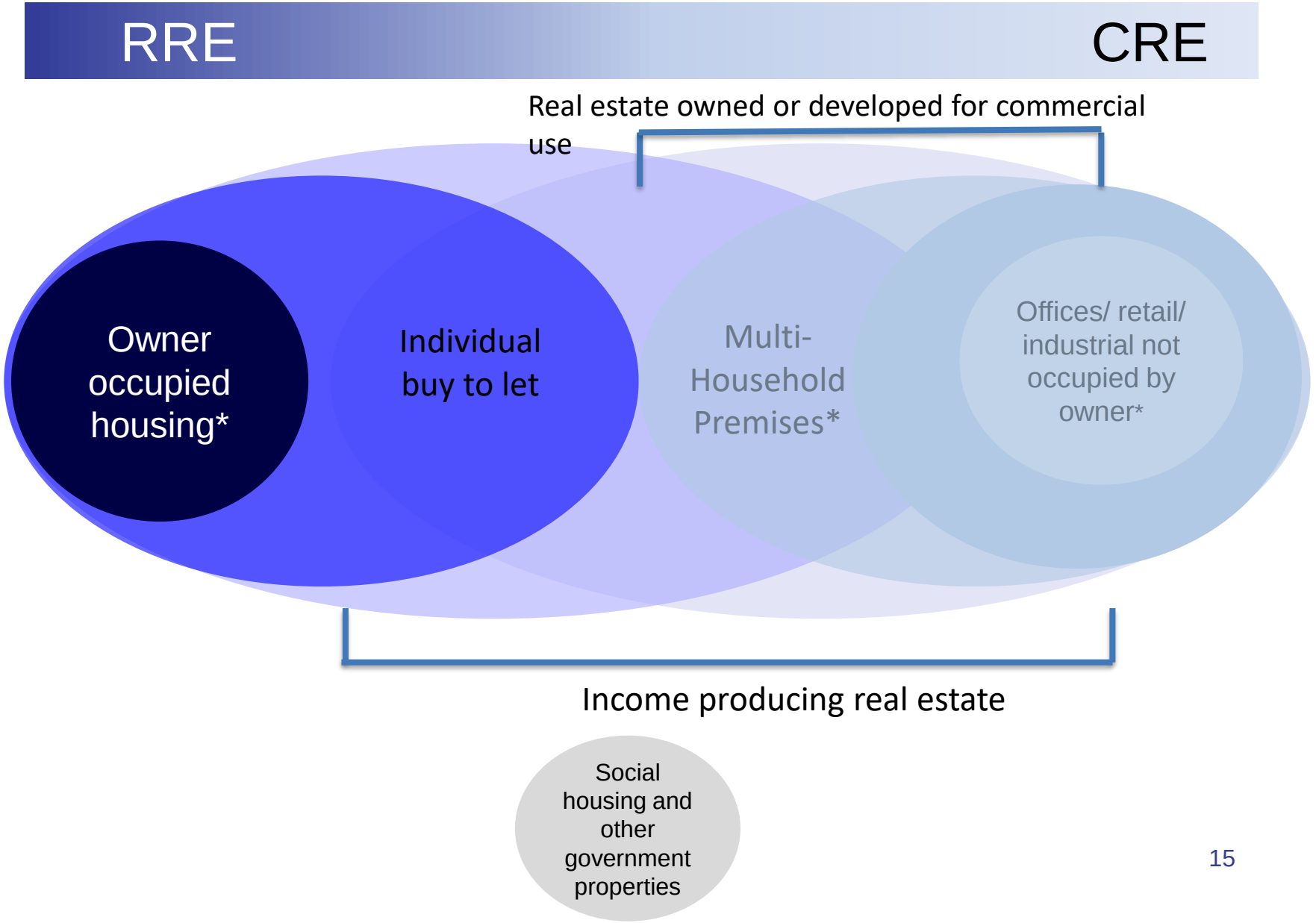
Residential and Commercial Real Estate

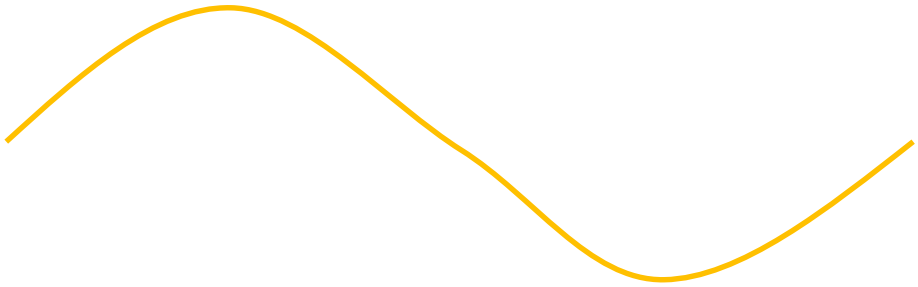


Drivers of demand in RRE and CRE

	RRE	CRE*
Household formation	X	
Dynamic of household age distribution	X	
Income/debt affordability (price to income, interest rates, indebtedness)	X	~X
Employment dynamics and structure (white vs. blue collar, sector concentration)	X	X
Consumption dynamics		X
Structure and health of the corporate sector (SME vs large, sector)		X
Tax system	X	~X
Legal environment (planning, building permits)	X	~X

* CRE often viewed as an alternative asset class for portfolio diversification/yield search (CRE demand affected by global financial conditions)

RRE and CRE cycles

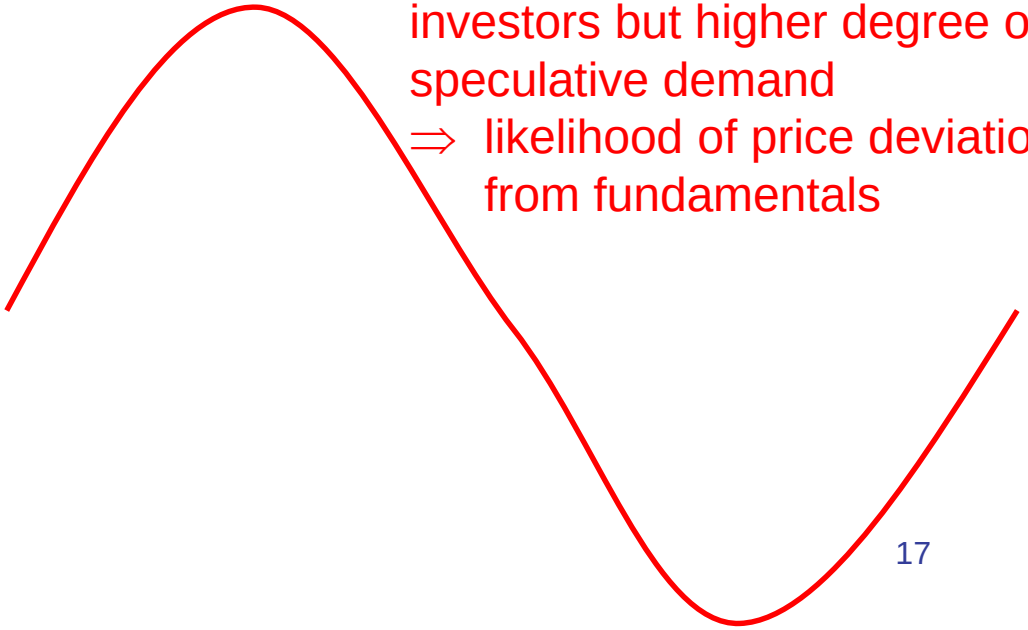


RRE

- Minimum consumption of housing services & large share of housing in net worth
  ⇒ fewer incentives to default
- More homogeneity
  ⇒ deeper markets
- But less informed small investors
  ⇒ likelihood of price deviation from fundamentals

CRE

- Demand more correlated with the business cycle & multiple investment projects
  ⇒ more incentives to default
- Specific destination of CRE project
  ⇒ thinner market
- More informed institutional investors but higher degree of speculative demand
  ⇒ likelihood of price deviation from fundamentals



Residential and commercial real estate

- **Residential real estate relatively "simple":**
  - Two players: households/owners vs banks (sometimes other mortgage providers)
- **Commercial real estate more complex:**
  - Equity investors: CRE companies, Investment funds and trusts, banks, insurance companies, etc
  - Funding of CRE: banks, insurance companies, specialized lenders, funds
    - Loans and bonds
- **RRE and CRE are interlinked**
  - They compete for the same scarce resource: land (especially in urban areas) and labour (in the construction sector)
  - In some cases, households and CRE investors demand the same type of good: residential units.

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Macroprudential risk and policy analysis of RRE

- **Risk analysis**
  - Goals of risk analysis
  - Understanding the cyclical position on markets
  - Measuring risks
    - RRE pricing; mortgage lending; household balance sheets; bank exposures; and structural features of the market
  - Final risk assessment, vulnerabilities and policy objectives
- **Policy analysis**
  - Available instruments and transmission channels
  - Linking policy objectives to instruments

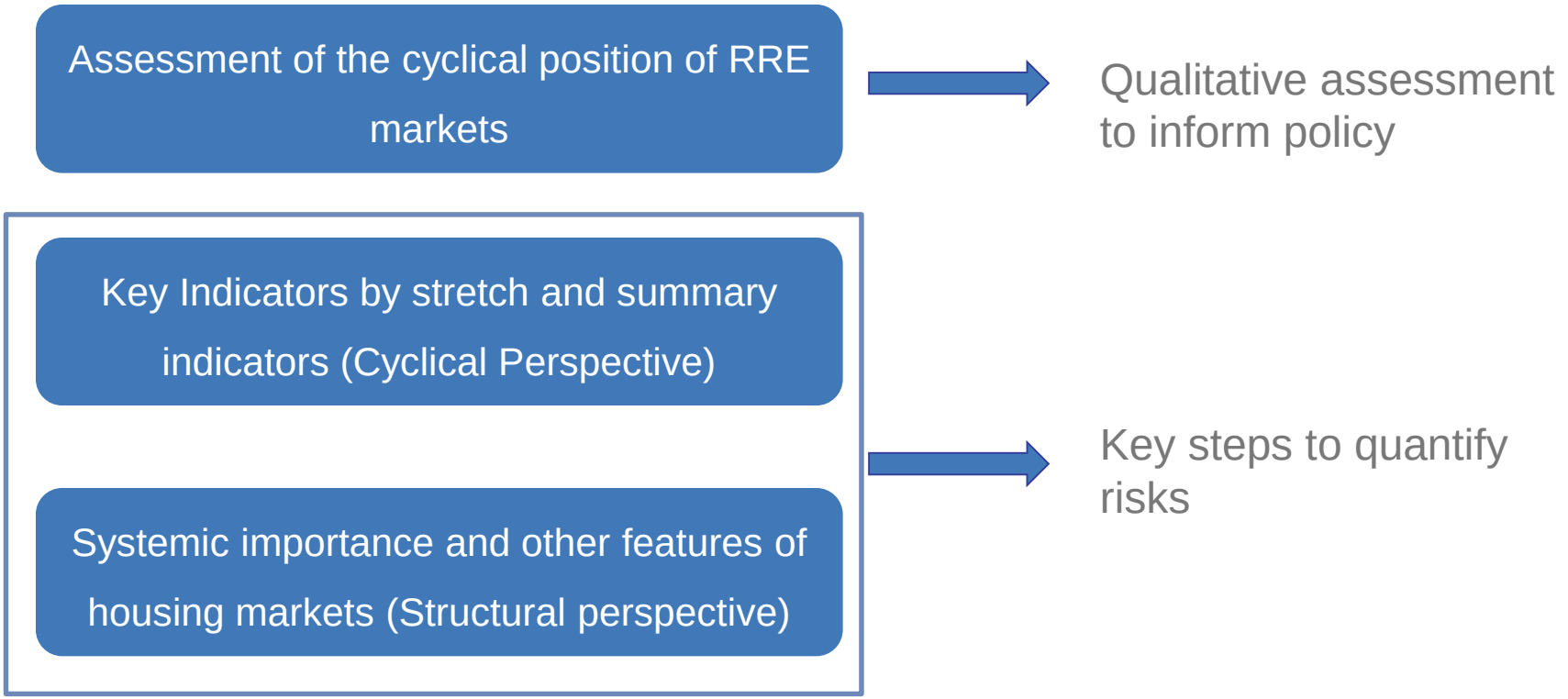
Note: this part is based on past and current analysis of the ECB and ESRB

- ESRB, 2016, Vulnerabilities in EU residential real estate markets, November 2016
- ESRB, 2016, Warnings on residential real estate risks, November 2016
- ESRB, forthcoming, Vulnerabilities in EU residential real estate markets, 2019 (planned)

Risk analysis: goals

- **Measuring risk intensity**
  - The risk analysis should deliver a measurement of risk intensity that provides a sense of urgency for policy action
    - E.g. risk rating with clear definitions for communication purposes
- **Identifying key vulnerabilities (e.g. low credit standards; high DSTI ratios)**
  - Identification of key vulnerabilities facilitates the selection of appropriate instruments and the monitoring of risks over time (stock vs flow vulnerabilities)
- **Identifying a risk scenario (e.g. drop in consumption)**
  - An adverse scenario based on key vulnerabilities can be used in bank stress tests to facilitate the calibration of policies (i.e.) capital measures
- **Facilitating identification of policy objectives**
  - Key vulnerabilities, risk transmission channels, position in the cycke can be used to identify policy objectives and subsequently link them to policies

Risk analysis: steps

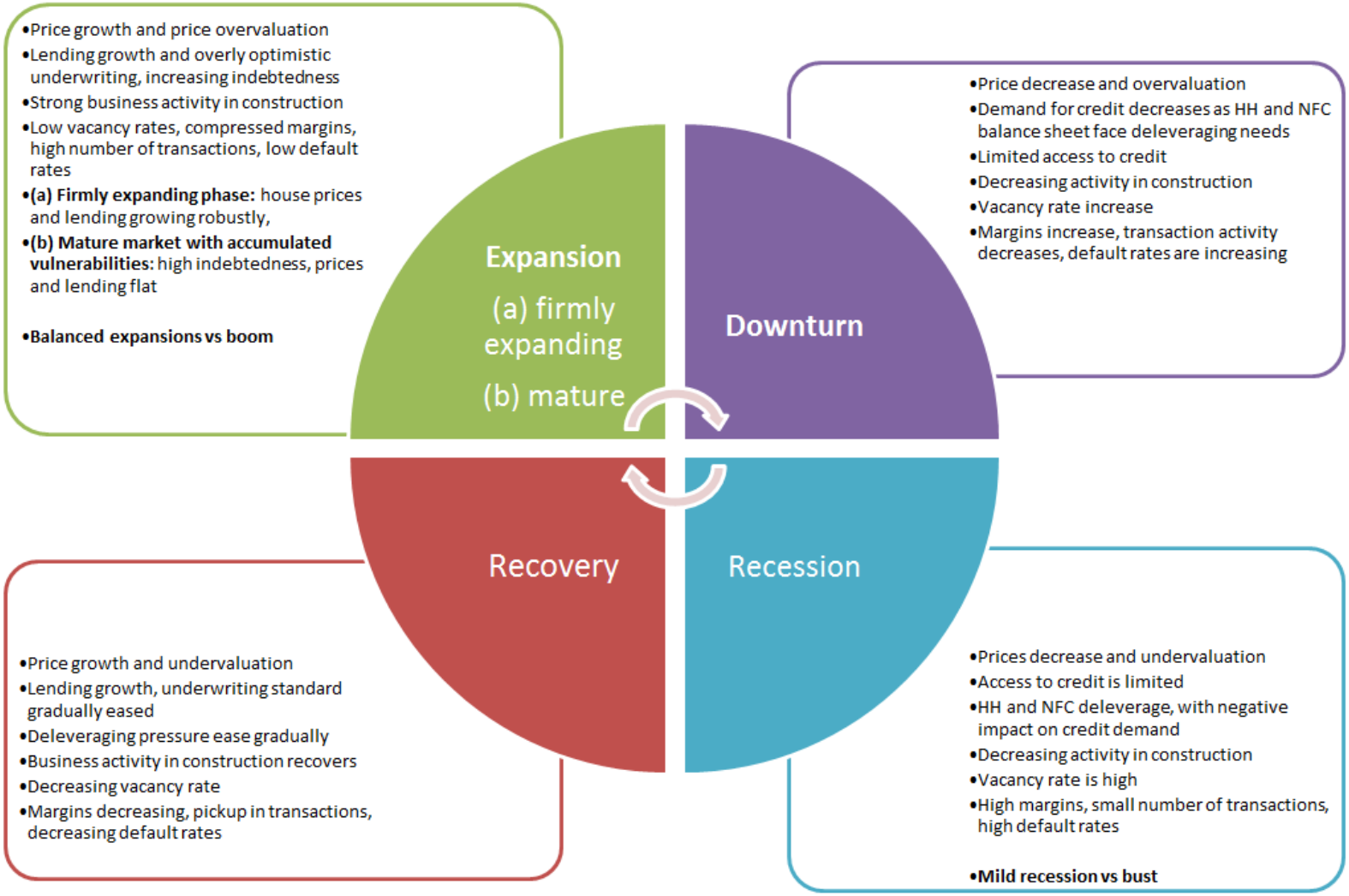


Risk analysis: cyclical position of RRE markets

- **Important to inform the risk assessment and the policy debate**
  - Macroprudential policy actions might differ depending on the cyclical position of markets.
  - A mature RRE market close to a turning point might require different policies and different calibrations of instruments compared to a market which is firmly expanding
- **Key issue: assessing the nature of the drivers of the real estate cycle i.e. temporary vs stable drivers**
  - What is the real estate cycle?
  - Methods: Statistical and structural models

Risk analysis: cyclical position of RRE markets

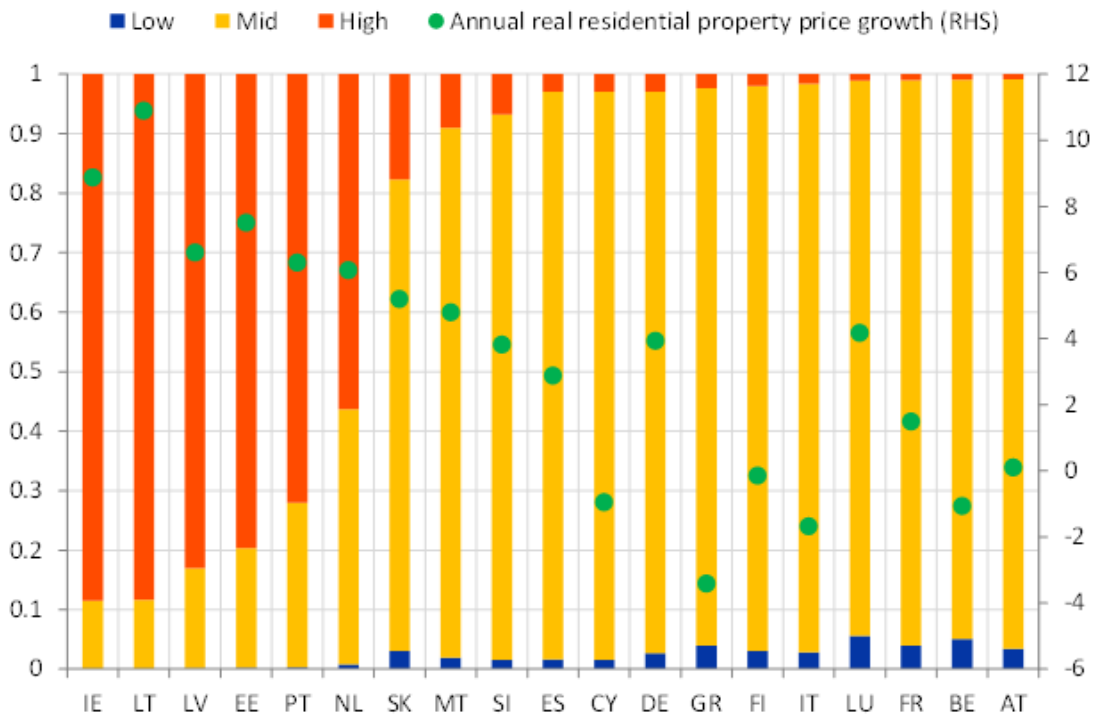
What is the real estate cycle?



Risk analysis: cyclical position of RRE markets

Example of model based assessment of the probability of turning points

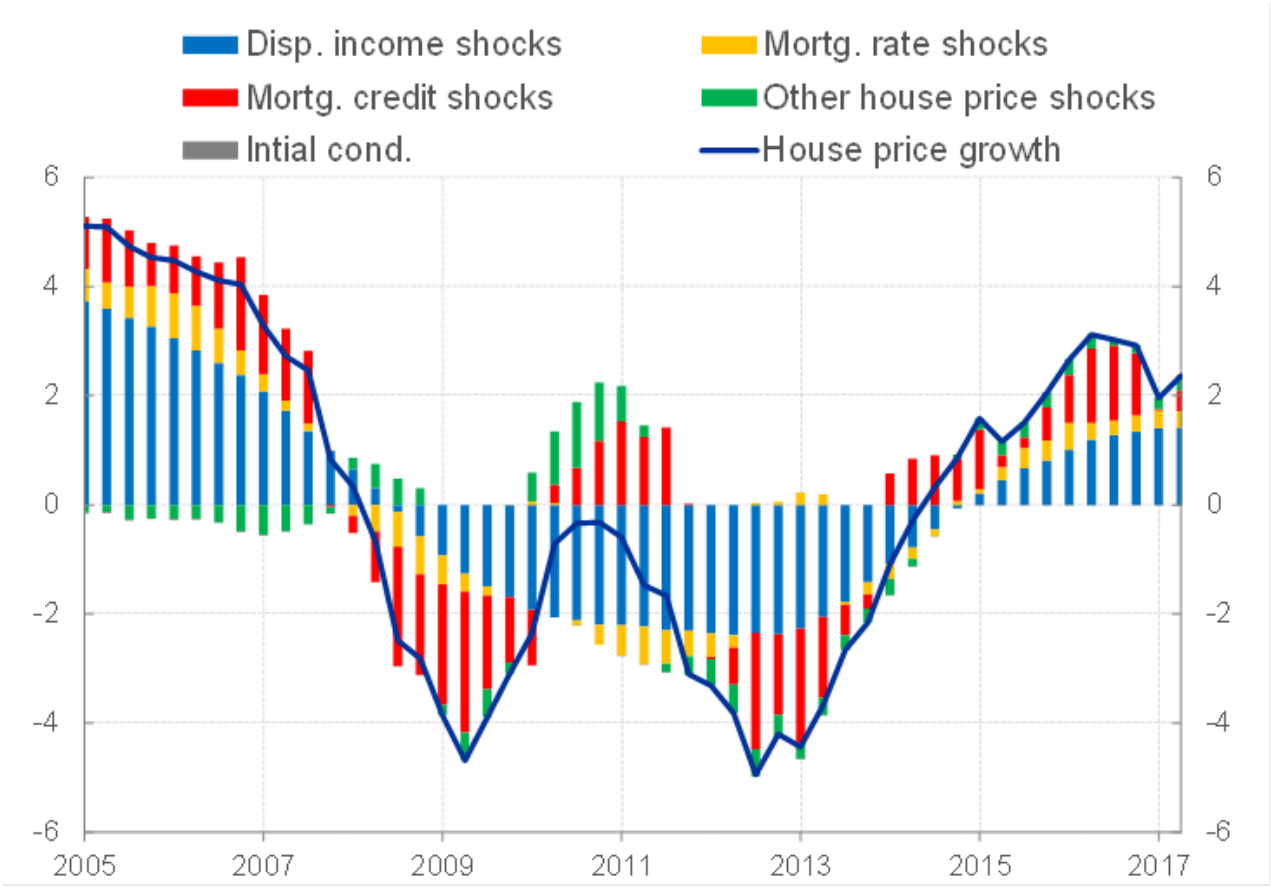
Probability of regimes for annual (real) residential property price growth (i.e. low, medium, high) in the next quarter



Sources: ECB and ECB calculations.
Note: Probability of being in each of three regime estimated through a Markov switching model where the transition probabilities are driven by (i) price to income ratio, (ii) bank credit growth, (iii) real GDP growth.

Risk analysis: cyclical position of RRE markets

Example: Model based assessment of the drivers of RRE prices



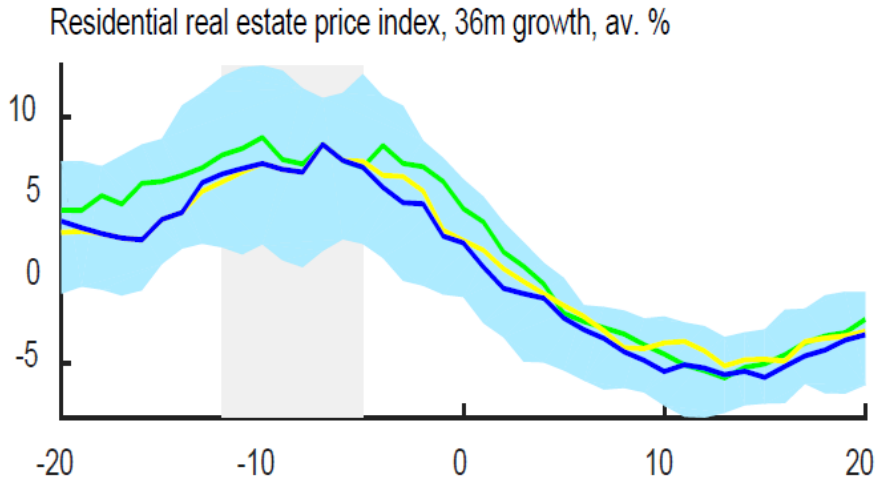
Source: ECB and ECB calculations.
Note: Historical decomposition based on a structural identification of a BVAR model. Estimation sample 1996Q1-2016Q4, BVAR model with hierarchical priors specified in log-deviations from trend. Structural identification was done using a mixture of sign and zero restrictions. Trend decomposed using estimated contributions of variables to trend house price growth.

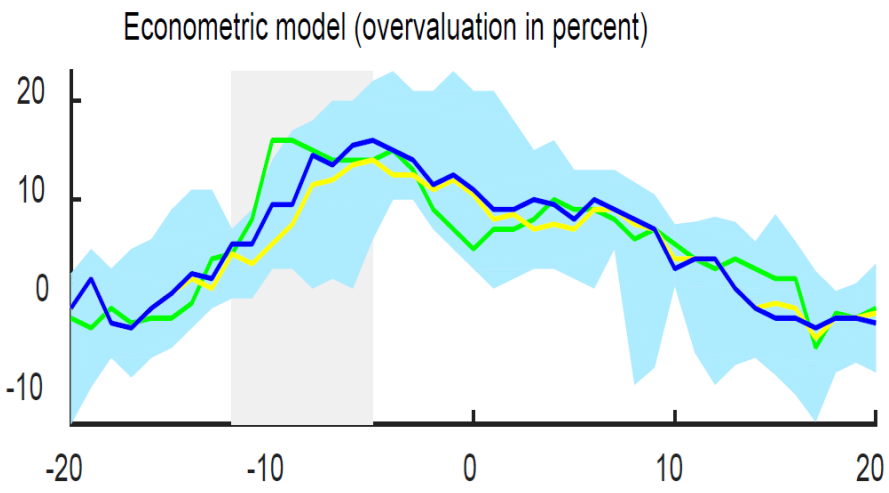
Risk analysis: measuring the intensity of risks

- **Measurement of risks focuses on indicators that cover different aspects of RRE markets**
  - Holistic approach to risk measurement
- **The three stretches approach (cyclical perspective)**
  - Collateral stretch (pricing of RRE)
  - Funding stretch (funding of RRE)
  - Household stretch (soundness of borrowers)
- **Other structural aspects included in the risk assessment**
  - Systemic importance of RRE markets (bank exposures, wealth effects, role of RE markets in real economy)
  - Structural features of RRE markets (supply, taxation, etc)

Risk analysis: measuring the intensity of risks

- **Collateral stretch**
  - Indicators to detect unsustainable price developments and potential price misalignments (price dynamics; valuations)
    - Early warning properties for crises and credit risk materialisation
    - Price developments feed into lending conditions and affect consumption and investment decisions

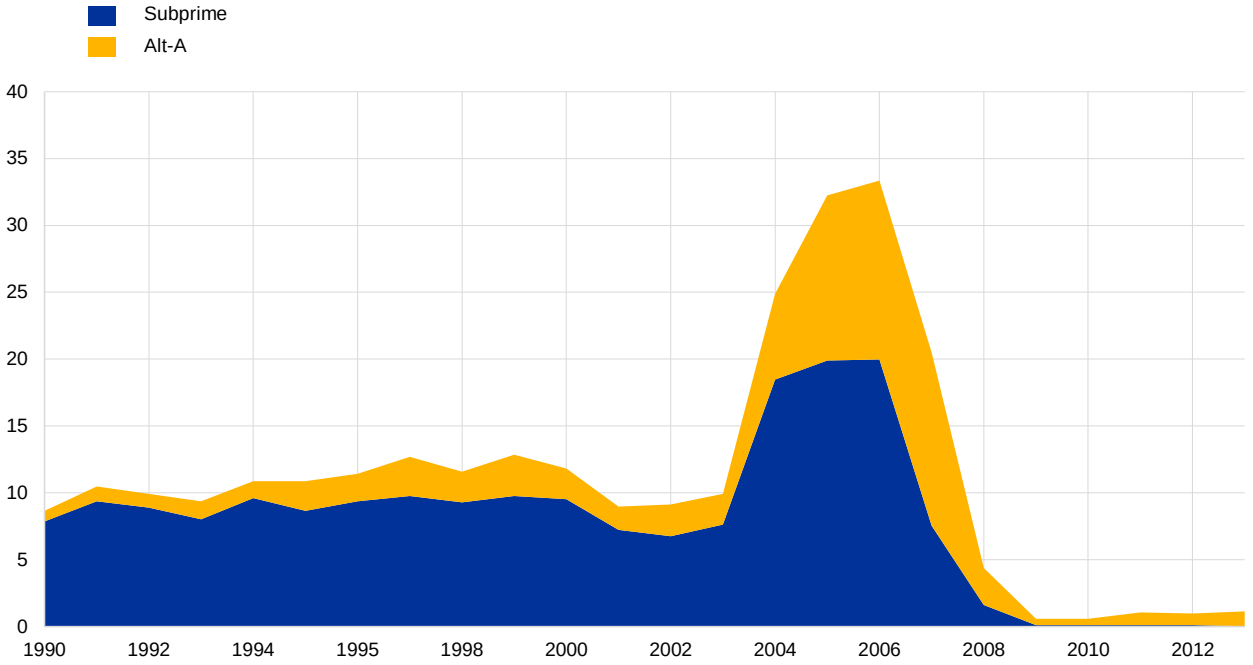




Risk analysis: measuring the intensity of risks

- **Funding stretch**
  - Indicators to detect of unsustainable developments in lending (lending growth, interest rates/spreads, credit standards)
    - Early warning properties for crises and credit risk materialization

Proportion of new mortgage debt originated by type

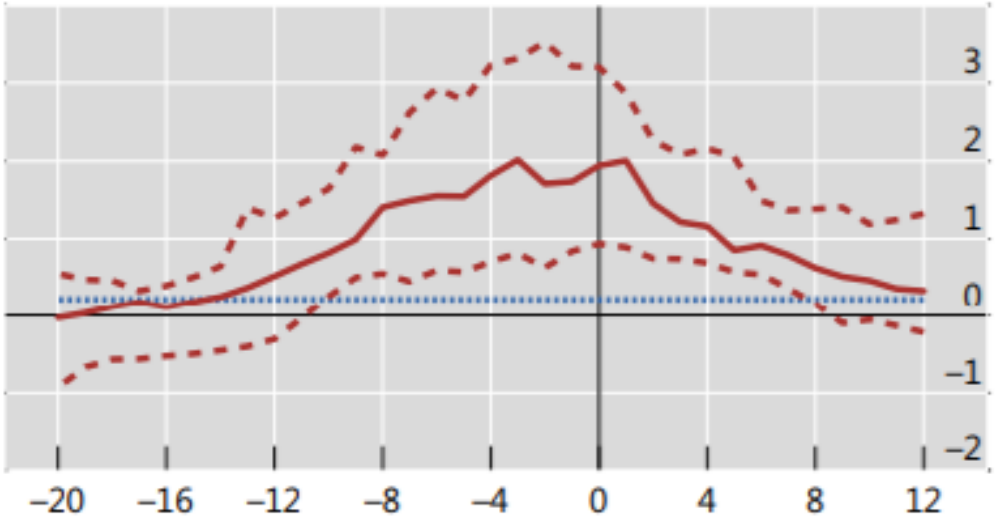


Source: Financial Times, Inside Mortgage Finance, Matthew Klein's calculations, https://ftalphaville.ft.com/2016/07/20/2170108/stop-pretending-americas-housing-boom-had-nothing-to-do-with-lending-standards/

Risk analysis: measuring the intensity of risks

- **Household stretch**
  - Indicators to assess the soundness of household balance sheets (debt levels, financial wealth; debt servicing ratios)
    - Early warning properties for crises and credit risk materialization
    - Capture potential for shock propagation e.g. via consumption

Household DSR²



Source: Aldaroso, Borio, Drehmann (2018): Early warning indicators of banking crises: expanding the family, BIS Quarterly Review, March 2018. 2 Difference of the household DSR from country-specific 20-year rolling averages.

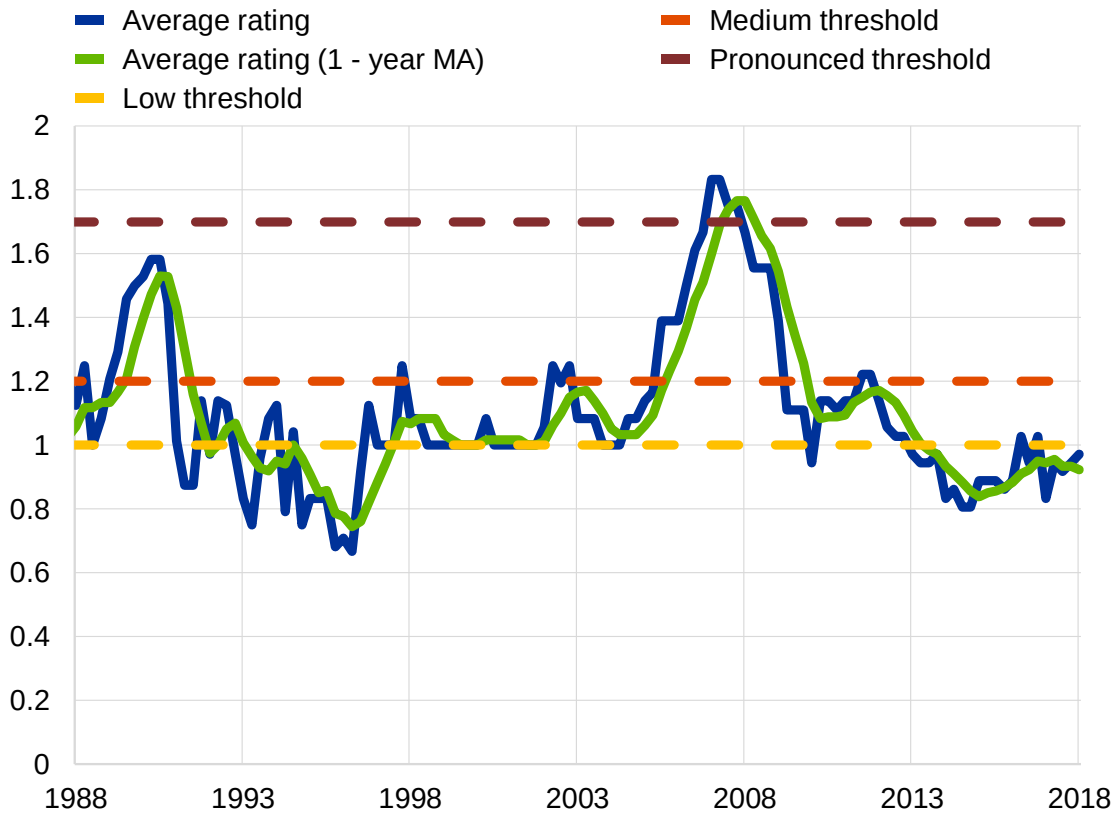
Risk analysis: measuring the intensity of risks

- **Summarizing cyclical risks: a scoreboard**
  - Set of key indicators that provides a fair (but not final) picture of RRE market vulnerabilities
  - It consists of a heat map and includes early warning thresholds and composite indicators
  - Thresholds based on model evidence where possible, distribution of the indicators, plausibility on the basis of experts' judgment

	Indicators										Summary measures	
	Price Indicators				Lending Indicators			Household Balance Sheet				
Country	Residential real estate price index, 12m growth, %	Residential price index relative to peak prior to 2014	RRE valuation measure, house price to income	RRE valuation measure, econometric model	Loans to HH for house purchases, 12m growth, %	Loans to HH for HP relative to peak prior to 2014	HH Loan spread	HH debt, % of GDP	HH financial assets to debt, %	Debt service to income ratio for HH, %	Average rating across indicators	Composite indicator
A	7.6	1.1	24.0	12.0	4.7	1.1	2.1	52.1	347.6	10.2	1.4	0.3
B	3.3	1.0	24.0	1.0	10.6	1.2	1.9	59.5	496.6	10.6	1.4	0.2
C	-0.1	0.7	-16.0	-4.0	-2.8	0.9	3.3	127.4	198.7	29.2	0.9	0.2
D	4.4	1.1	2.0	0.0	3.6	1.1	1.9	53.6	333.1	9.5	0.6	0.0
E	8.0	0.9	12.0	-8.0	4.7	1.0	2.2	40.3	258.1	7.5	0.7	-0.1
F	4.2	0.7	-9.0	5.0	-4.0	0.8	1.9	67.5	273.0	13.3	0.5	-0.1
G	-0.1	1.0	9.0	5.0	2.5	1.0	1.4	67.4	206.4	11.4	1.4	0.2
H	-0.3	0.9	13.0	2.0	3.2	1.0	1.8	56.6	392.0	9.9	0.7	0.0
I	-5.4	0.6	-25.0	-5.0	-3.7	0.8	2.7	62.3	218.8	22.3	0.7	-0.3
L	6.6	0.7	-6.0	-23.0	-2.1	0.6	3.5	69.7	234.6	22.1	0.8	-0.3
T1	4.0	0.9	2.5	2.5	5.0	1.0	1.5	50.0	220.0	10.0	1.0	0.0
T2	6.5	1.0	5.0	5.0	7.5	1.1	1.8	70.0	240.0	15.0	1.2	0.2
T3	9.0	1.1	7.5	7.5	10.0	1.2	2.0	90.0	260.0	20.0	1.7	0.5
TR	4.0	0.9	2.5	2.5	5.0	1.0	2.0	50.0	260.0	10.0	10.0	

Risk analysis: measuring the intensity of risks

- **Composite risk indicator for RRE in the euro area**



Source: ECB and ECB calculations

Notes: The median risk rating in the SSM is computed as average of ratings across a groups of indicators including prices, lending and households' balance sheet indicators. 1 year MA stands for 1 year moving average. Last obs: Q2 2018

Risk analysis: measuring the intensity of risks

- **Systemic importance of housing markets**
  - Goal: to assess the potential for spillovers of shocks from RRE to the rest of the economy and to the financial sector

Country	GFCF dwellings (% of GDP)	Bank exposures to RRE (% of GDP)	Non-Bank intermediary exposures to RE markets (% of GDP)	Bank exposures to RRE (% of capital)	Bank exposures to construction and real estate activites (% of capital)	Housing wealth (% of GDP)
AT	4.3	27.7	2.4	168.2	134.0	226.8
BE	5.8	33.5	2.6	411.7	83.1	254.7
BG	2.8	9.5	0.3	N/A	62.2	N/A
CY	5.5	57.9	0.9	243.4	154.2	254.3
CZ	3.9	23.5	0.0	264.1	N/A	N/A
DE	6.0	35.8	10.4	89.8	67.2	223.8
DK	4.6	101.4	0.3	612.4	263.5	N/A
EE	4.5	30.8	1.7	220.0	77.5	173.1
ES	5.1	45.5	0.2	452.9	89.4	425.6
FI	6.5	42.9	4.2	618.7	173.8	176.2
FR	6.1	42.6	4.7	164.6	92.8	316.0
GB	3.9	58.5	N/A	N/A	N/A	N/A
GR	0.6	32.9	1.6	191.1	74.8	393.9
HR	N/A	14.6	0.1	96.0	36.3	N/A
HU	2.4	7.9	2.6	N/A	57.9	N/A
IE	2.3	26.4	8.0	254.4	54.9	170.3
IT	4.4	21.9	4.0	252.0	174.4	279.1
LT	2.7	17.1	1.5	344.3	108.9	130.2
LU	3.0	50.1	163.4	65.9	43.9	113.3
LV	1.8	16.2	0.2	172.6	112.9	307.0
MT	4.9	40.9	0.4	164.3	90.0	176.1
NL	4.4	65.8	29.0	617.0	122.7	214.8
PL	2.5	20.3	0.0	203.7	42.6	N/A
PT	2.6	48.3	7.2	401.9	105.7	269.9
RO	2.6	7.6	0.0	204.9	56.5	N/A
SE	5.7	66.2	0.1	615.8	N/A	N/A
SI	2.2	13.8	0.1	127.4	31.4	189.4
SK	2.5	29.9	1.4	346.2	60.9	163.3
EU average	3.8	35.3	9.2	292.1	94.9	234.6
EU median	3.9	31.9	1.5	243.4	83.1	223.8

Risk analysis: measuring the intensity of risks

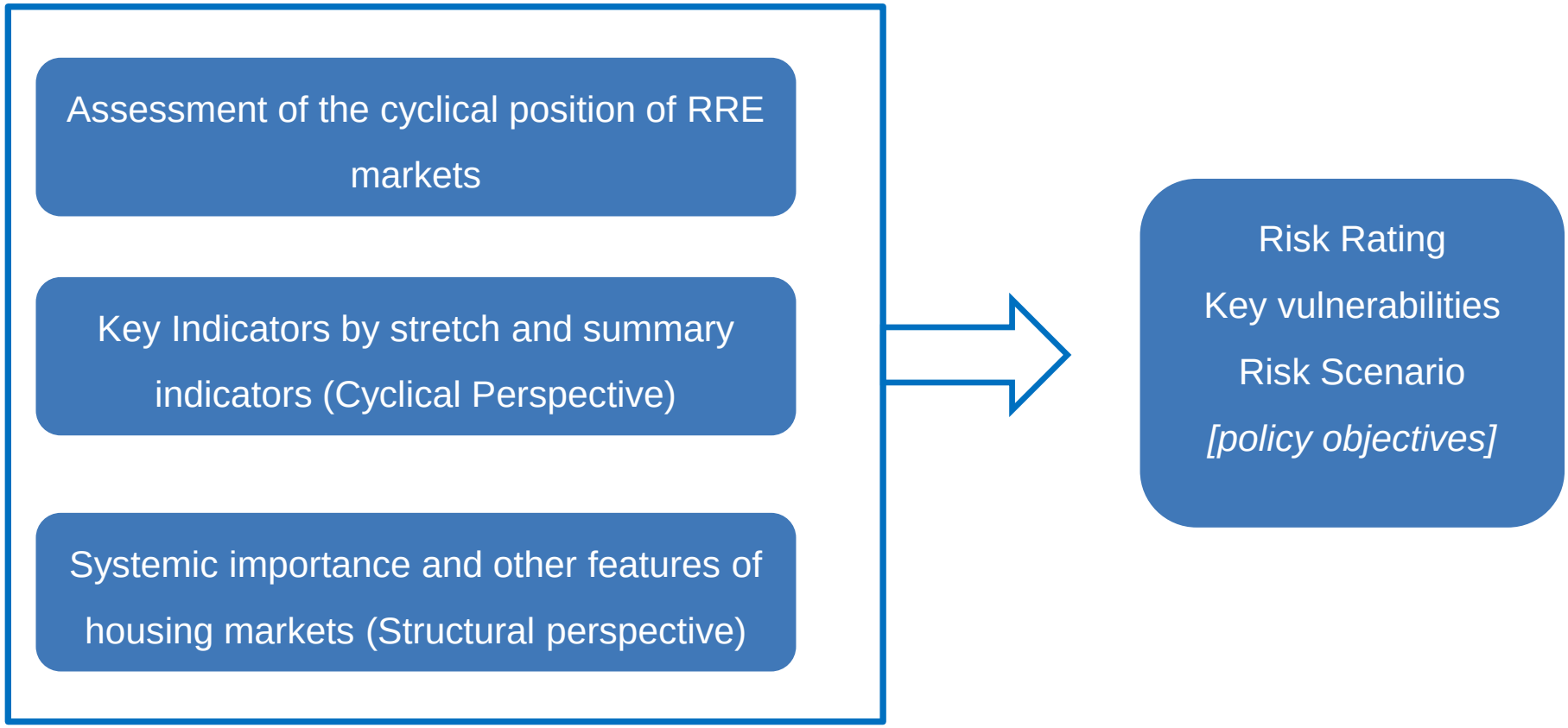
- **Other structural features of housing markets**
  - Scarce evidence and lack of clear results on the impact of structural features in RRE markets on financial stability
  - Many features have both amplifying and mitigating effects that vary over the cycle, and their effects often depend on interactions with other policies
  - A potential perspective: Analyse whether particular features increase/decrease volatility and whether this effect is large or small
- **Qualitative assessment of structural features in the risks assessment**
  - Due to uncertainty on direction/size of impact on financial stability risks

Risk analysis: measuring the intensity of risks

Structural feature	Amplifying/mitigating	Countries
Market characteristics		
Home ownership ("un/balanced rental market")	High: Increases volatility	**EE, SK**
	Low: Reduces volatility	**AT, DK, UK**
Share of variable mortgage interest rates	High: Increases volatility	**AT, FI, LU, UK**
	Low: Reduces volatility	**BE, DK, NL**
Taxes & transaction costs		
Subsidies/tax breaks (including deductibility)	High: Increases volatility	**EE, NL**
	Low: Reduces volatility	**BE, DK, UK**
Transaction costs	High: Reduces volatility but also liquidity	**BE, FI**
Supply side characteristics		
Price elasticity of supply	High: Reduces volatility but risk of overshooting	**DK, SE, FI**
	Low: Increases volatility but less overshooting risk	**AT, BE, EE, LU, NL, UK**
Demand side characteristics		
Net migration	High: Reduces risk of price drops	**AT, LU, SE**
Household structure dynamics - number of households	Increasing: Reduces risk of price drops	**AT, FI, LU**
	Decreasing: Increases risk of price drops	**SE**

Strong effects

The outcome of risk analysis



The outcome of risk analysis

- **Risk rating**
  - "High risk": vulnerabilities that can be addressed by macroprudential policies are widespread
  - "medium risk": vulnerabilities that can be addressed by macroprudential policy are present
  - "low risk": vulnerabilities require monitoring by macroprudential authorities
- **Example of key vulnerabilities**
  - **Stock vulnerabilities:** household indebtedness; risk features of the stock of mortgage loans; price overvaluation;
  - **Flow vulnerabilities:** rising household indebtedness; risk features of new loans; lending dynamics; price dynamics

Overview

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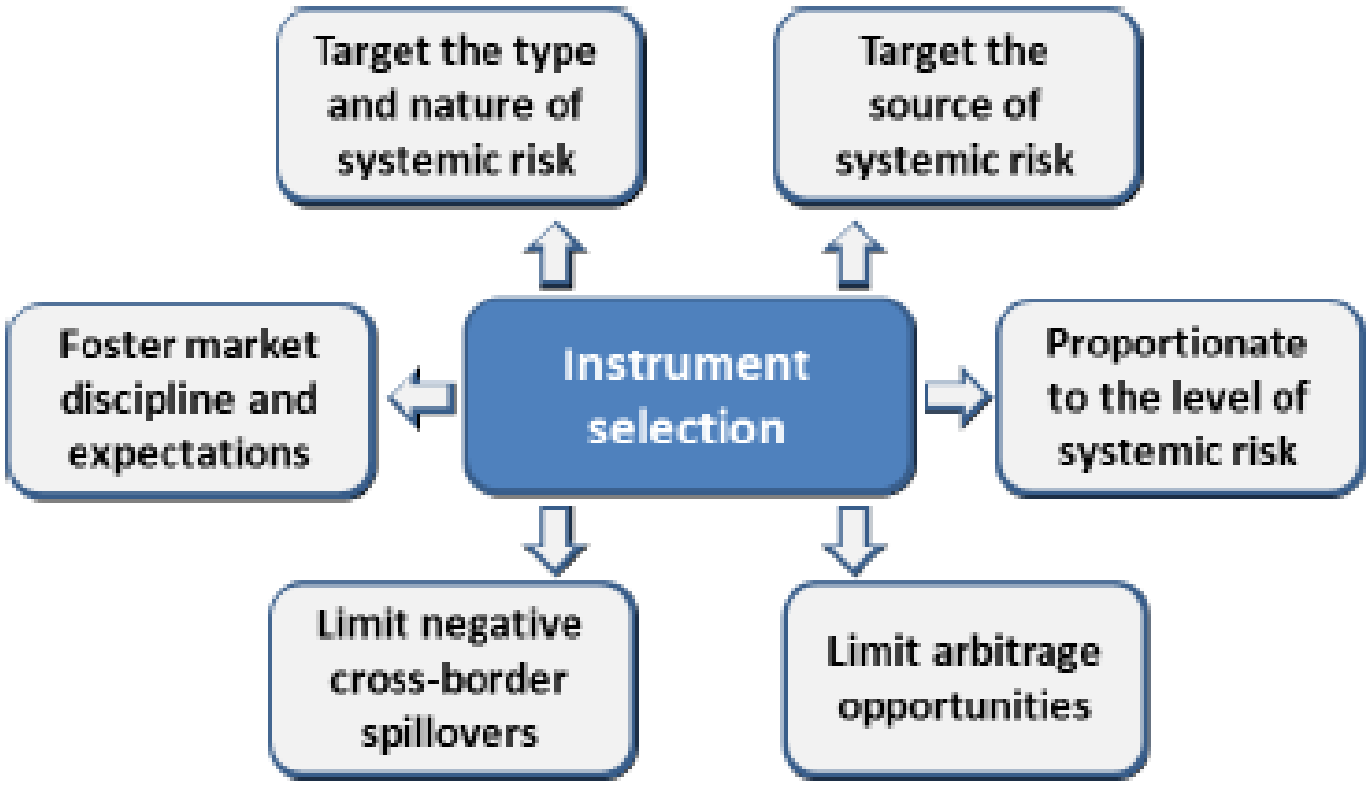
    2. **Policy analysis**
4. Conclusions

Policy analysis: linking vulnerabilities to policy objectives

	Identified risks and vulnerabilities	Policy objective
Collateral stretch	RRE price dynamics (Flow)	Ensure that price dynamics do not lead to a deterioration of credit standards
	RRE price overvaluation (Stock)	Strengthen the resilience of lenders and borrowers to a house price correction.
Funding stretch	Mortgage credit growth; risk taking/credit quality (Flow)	Limit the risk of a credit and house price spiral by containing excessive credit growth.
	Lending standards and pricing of new lending; risk taking (Flow)	Ensure that lending standards remain appropriate; limit the incentives for risk taking by banks
Household stretch	Increasing HH indebtedness/debt service ratios (Flow)	Contain credit growth and ensure sustainability of household debt
	High HH indebtedness/debt service ratios/ vulnerable household balance sheets (e.g. exposure to interest rate risk) (stock)	Strengthen banks' resilience to the materialization of risks stemming from HH indebtedness.

- Note: Vulnerabilities pointing to similar policy objectives reinforce the need for policy action to address the objective

Policy analysis: Instrument selection



Policy analysis: next steps

- **Available instruments and transmission channels**
  - Risk weights
  - Borrower based measures
  - Synergies and complementarities among instruments
- **Linking policy objectives to instruments**
  - Role of country specificities in shaping the macroprudential response

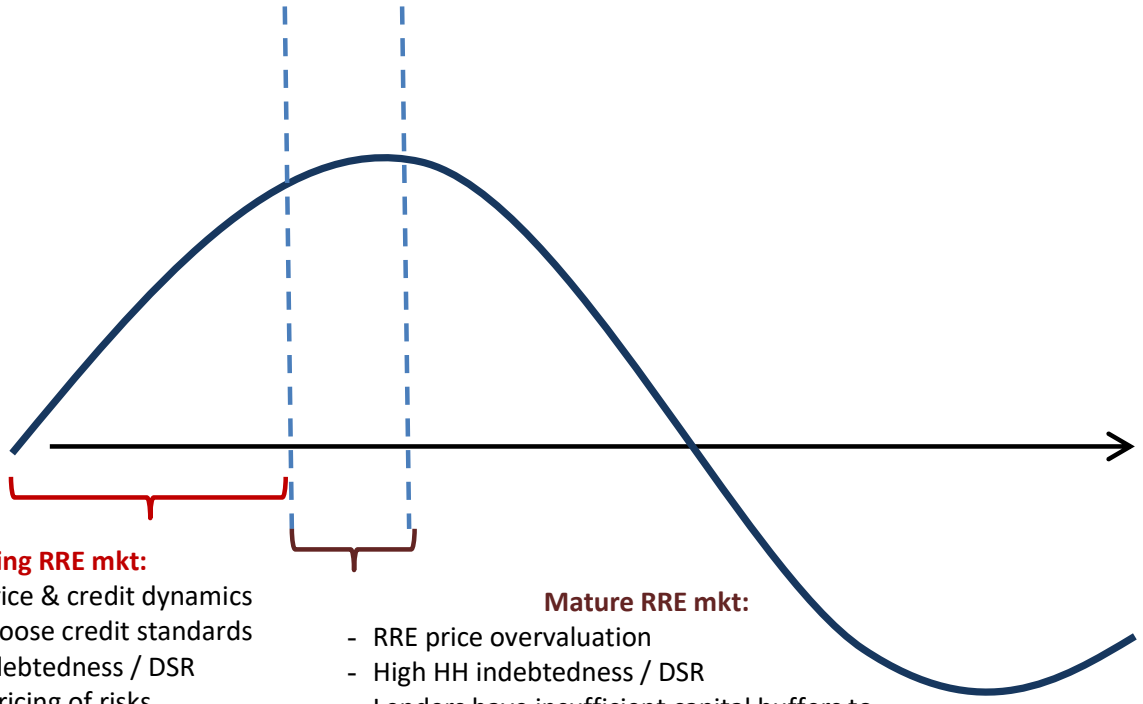
RRE policy instruments: risk weights

- **Denominator of bank capital ratios: total risk weighted assets**
  - With RWA $= \Sigma RW_j \times A_j$ where j is a asset
- **Two options for setting RW: Basel Standardised Approach (SA) or Internal Rating Based (IRB)**
  - With IRB banks estimate RW on the basis of internal models that take into account borrowers' PDs and LGDs
  - RW under SA approach are normally higher than under the IRB approach
- **RW policy = possibility of imposing higher risk weights to banks**
- **Imposing add-ons or floors on RW on RRE exposures results in lower capital ratios ceteris paribus**
  - Floors: can be applied to the average RW of the RRE portfolio or can apply to individual loans
  - Add-ons: can apply to all loans or to specific loans (e.g. high LTV loans)

RRE policy instruments: Borrower Based measures

- **Authorities specify rules that banks should apply on credit standards:**
  - Loan to Value (LTV) ratio
    - It requires borrowers to use equity (“skin in the game”)
    - It lowers incentives to default (lowers PD) and it lowers the loss given default (LGD)
  - Debt/Loan to Income (D/LTI) ratio
    - It links the borrowing capacity to the income of the borrower
    - It lower credit risk (it lowers PD)
  - Debt/Loan service to Income (D/LSTI) ratio
    - It links the borrowing capacity to servicing costs in relation to income of the borrower
    - It ensures the existence of buffers to meet regular payments (it lowers PD)
  - Maturity limits and amortisation requirements
    - Also complementary role (eg DSTI)

Use instruments over the real estate cycle



Expanding RRE mkt:

- Exuberant RRE price & credit dynamics
- Deteriorating or loose credit standards
- Increasing HH indebtedness / DSR
  Lenders' under-pricing of risks
  (compressed lending margins)

Mature RRE mkt:

- RRE price overvaluation
- High HH indebtedness / DSR
- Lenders have insufficient capital buffers to withstand potential losses in the RRE portfolio

BB measures have primary role

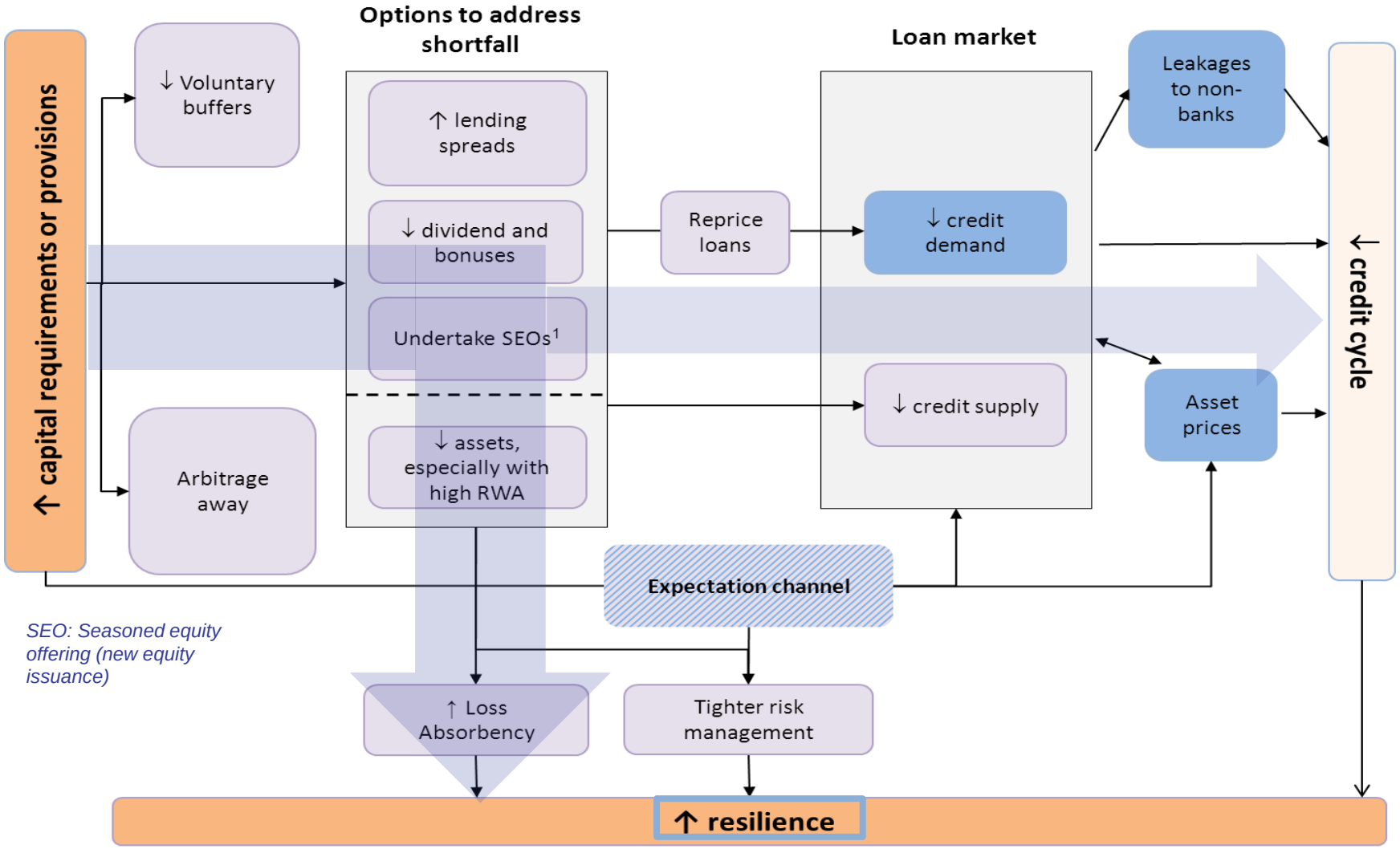
Capital-based measures have primary role

Caveat: the accumulation of capital buffers takes time

Transmission channels of RWs and BB measures

- **RW policies:**
  - Primary impact (stocks): Increase bank resilience to the materialisation of risk in the RRE lending portfolio
  - Secondary impact (flows): affect bank incentives (impact on pricing, risk features, and quantity of new lending)
- **BB measures:**
  - Primary impact (flows): quantity and quality of new lending;
  - Secondary impact (stocks): improve the quality of the overall bank lending portfolio in the medium term (lower LGDs and PDs of average loan)

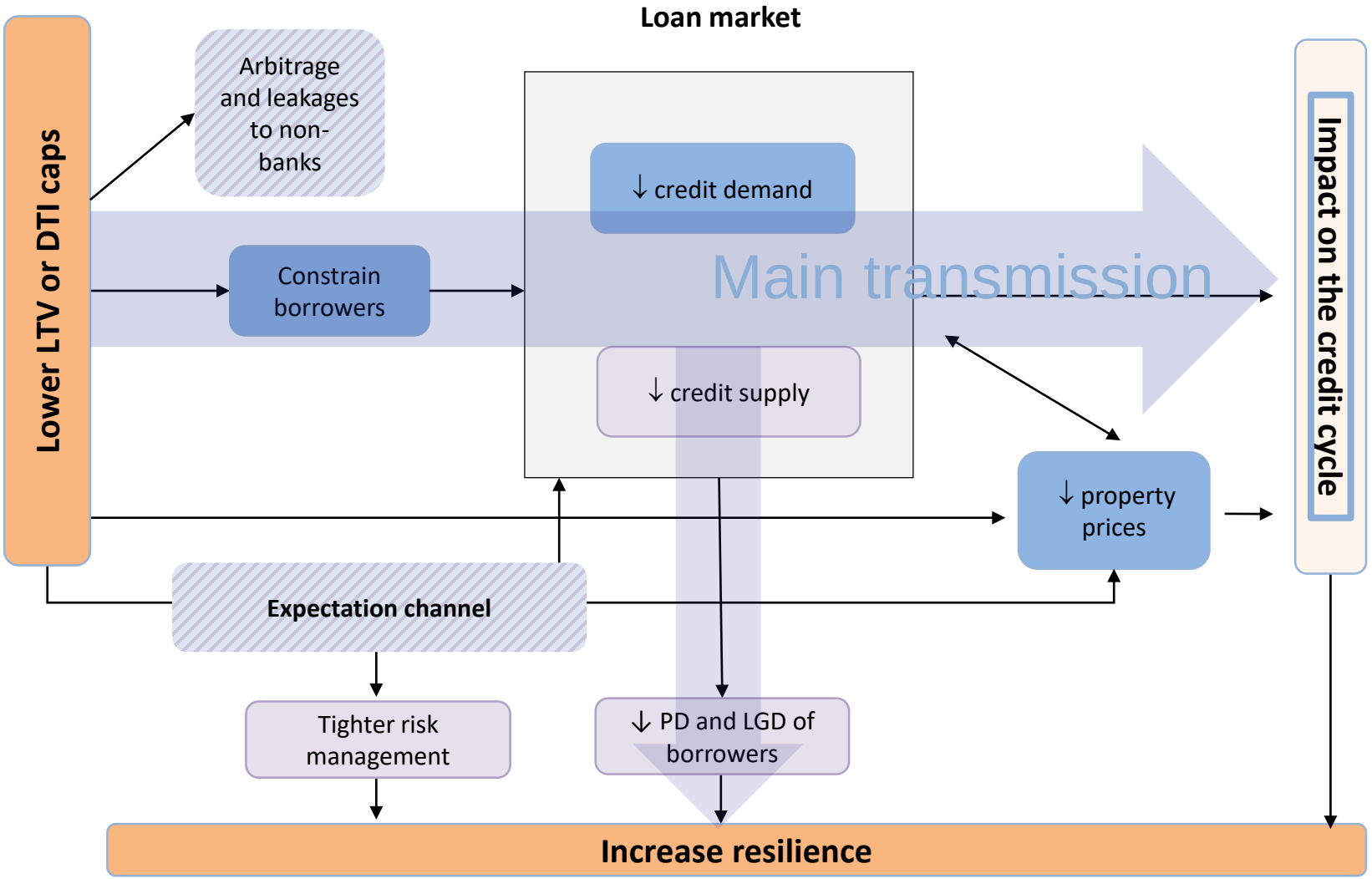
Transmission channels: risk weights



SEO: Seasoned equity offering (new equity issuance)

Source: CGFS Report "Operationalizing the Selection and Application of Macro-Prudential Instruments", Dec. 2012

Transmission channels: BB measures



Source: CGFS Report "Operationalizing the Selection and Application of Macro-Prudential Instruments", Dec. 2012

RRE policy instruments: Combined use

- **Synergies and complementarities among borrower based measures**
  - LTV: primary effect on LGD; it does not de-link credit demand from V
  - DTI: primary effect on PD; it links credit demand to income; it avoids that unsecured loans are used to circumvent LTV;
- **Synergies and complementarities between borrower based measures and capital measures**
  - BB measures reduce PD and LGD of the overall stock of bank loans over the medium term
    - Banks might require less capital ceteris paribus
  - Capital measures affect the pricing of riskier loans and might reduce their quantity
    - Same impact of BB measures (but capital measures operate via incentives while BB measures operate via hard limits)

Policy objectives and appropriate instruments

- **Indicative rules:**
  - Use capital measures to address stock vulnerabilities (taking into consideration that building up buffers takes time)
  - Use borrower based measures to address flow issues

Identified risks and vulnerabilities	Policy objective	Policy Instrument
RRE price dynamics (Flow)	Ensure that price dynamics do not lead to a deterioration of credit standards	Borrower Based measures
RRE price overvaluation (Stock)	Strengthen the resilience of lenders and borrowers to a house price correction.	Capital measures (RW or broader capital measure depending on the risk of spillovers); LTV depending on the position of RRE Cycle
Mortgage credit growth; risk taking/credit quality (Flow)	Limit the risk of a credit and house price spiral by containing excessive credit growth.	Borrower Based measures (primary); capital measures (secondary);
Lending standards and pricing of new lending; risk taking (Flow)	Ensure that lending standards remain appropriate; limit the incentives for risk taking by banks	Borrower Based measures (primary); capital measures (secondary);
Increasing HH indebtedness/debt service ratios (Flow)	Contain credit growth and ensure sustainability of household debt	Borrower Based measures (primary);
High HH indebtedness/debt service ratios/ vulnerable household balance sheets (e.g. exposure to interest rate risk) (stock)	Strengthen banks' resilience to the materialization of risks stemming from HH indebtedness.	Capital measures (RW or broader capital measure depending on the risk of spillovers); BB measures depending on the position of RRE Cycle

Additional considerations on the selection of instruments

Institutional framework: EU and national legal basis, mandates of micro and macro-prudential authorities, political considerations	If the most appropriate policy is not available or feasible, authorities may choose second-best policies
Structural real estate market characteristics: elasticity of housing supply, functioning of the rental market	Appropriate policy response may lie outside the scope of macroprudential policy. E.g. price dynamics caused by tight housing supply
Fiscal, tax and monetary policies: fiscal incentives for mortgage lending, real estate taxation, interest rate	Appropriate policy response may lie outside the scope of macroprudential policy. E.g. high HH indebtedness caused by tax incentives
Cross-border and cross-sectional spillovers: role of foreign FIs in domestic market, role of domestic FIs in foreign markets	Spillovers may affect the instrument choice: is the policy tool still effective, can it be easily reciprocated, does it have a substantial impact on foreign markets?
Arbitrage/leakage: role of non-bank financial institutions	Leakage may affect the instrument choice: is the policy tool still effective, can leakage be addressed by a combination of (macro)prudential measures?

Enacted RRE policies in the euro area

	LTV limits (reduces LGD)	Income-based limits (reduces PD)	Maturity limits (reduces long-term IR sensitivity)	Risk weights on RRE exposures
BE				5 p.p. RW add-on and 33% non linear RW multiplier (under Art 458 CRR)
CY	70% (80% if primary residence)	DSTI: 80% (65% if FX loans)		
EE	85% (90% if state guaranteed)	DSTI: 50%	30 years	
FI	85% 1/ (95% if FTB)			15% floor on for IRB banks (under Art 458 CRR)
IE	90% (+5%) FTB; 80% (+20%) SSB 70% (+10%) BTL	LTI <3.5 (+20%) FTB, (+10%) SSB		
LV	90% (95% if state guaranteed)	Internal DSTI limits		
LT	85%	DSTI: 40%-60% IR sensitivity test at origination	30 years	
LU				75% for part of loan with LTV>80% and 35% for the rest of the loan for STA banks 15% floor for IRB banks (recommended)
MT				35% for part of loan below LTV<70% 100% for rest of loan
NL	100%	DSTI: 10 - 30%	30 years	
PT*	90% (80% for other than own and permanent residence)	DSTI: 50%	40 years (10 years for consumer credit)	
SK	90% (+0%), 80% (+35%) 2/	DSTI: 80% (interest rate sensitivity test if maturity >8 years) DTI<=8 (+20%) 2/	30 years (+10%) (8 years for unsecured loans)	
SI	80%	DSTI: 50 - 67%		35% for loans with LTV<60%

Note: **As of 12 July 2018**; FTB - first time buyer, SSB - second and subsequent buyer, BTL - buy to let
The + sign indicates the exemption/speed limit (the percent of new loans that can be granted above the limit of the lending standard)
National specific measures not always comparable given different definitions of loans, value/collateral and/or income.
1/ The limit in Finland is on loan to collateral (LTC), rather than loan to value (LTV).
2/For LTV, the 35% allowance will be phased down as follows: 30% as of 1/10/2018, 25% as of 1/1/2019, 20% as of 1/7/2019. For DTI, the allowance of 20% will be phased down as follows: 15% 1/10/2018, 10% as of 1/1/2019 and 5%+5% with additional conditions as of 1/7/2019.
* The measures are adopted by Banco de Portugal as a Recommendation, based on the "comply or explain" principle.

Example of enacted policies: Slovakia (1)

Key objectives and evolution of borrower based measures in Slovakia

	Original setting (2014-2015) (non-binding)	**1st revision (2016-2017)** (binding)	**2nd revision (as of July 2018)** (binding)
Main objective of measures	**Sound and sustainable credit growth** (preventing excessive easing of lending practices)	**1. Sound and sustainable credit growth** 2. Addressing risks related to vulnerabilities emerging on the RRE market	**1. Sound and sustainable credit growth** **2. Addressing risks related to rising household indebtedness**

	Original setting (2014-2015) (non-binding)	**1st revision (2016-2017)** (binding)	**2nd revision (as of July 2018)** (binding)
LTV limit	Max. share of LTV 90+: 10%	Max. share of LTV 90+: 10% Max. share of LTV 80+: 40% (phase-in)	Max. LTV 90% Max. share of LTV 80+: 20% (phase-in)
DSTI limit	100 %	80 % (phase-in)	80 %
Interest rate sensitivity test	Applies to new loans only	Applies to all customer´s loans with variable interest rates	No change
Maturity limit	RRE-secured loans: 30Y (excep. 10 %) Unsecured loans: 8Y (phase-in applied)	No change	No change
Amortization rule	Mandatory amortization with annuity	No change	No change
DTI	Not set	Not set	DTI limit: 8 (after tax income) Max. share of DTI 8+: 10%

Source: NBS

Example of enacted policies: Slovakia (2)

- **Key policy principles**
  - Measures should target key risks and be proportionate (eg subsistence amounts in DSTI denominator)
  - Extensive discussions with and specific knowledge of local credit markets
  - Phase-in approach to ensure buy-in and prevent shocks to market
  - Comprehensive - to prevent circumvention (eg DSTI + maturity + amortization)
  - Primary objectives: prudent LS + borrower/bank resilience; taming the cycle secondary benefit
- **Operational considerations**
  - Monitoring based on quarterly detailed loan distribution templates
  - Given size of market, calibration emphasizes market practices and peer country comparison but as the implementation evolved, more quantitative approaches are being employed

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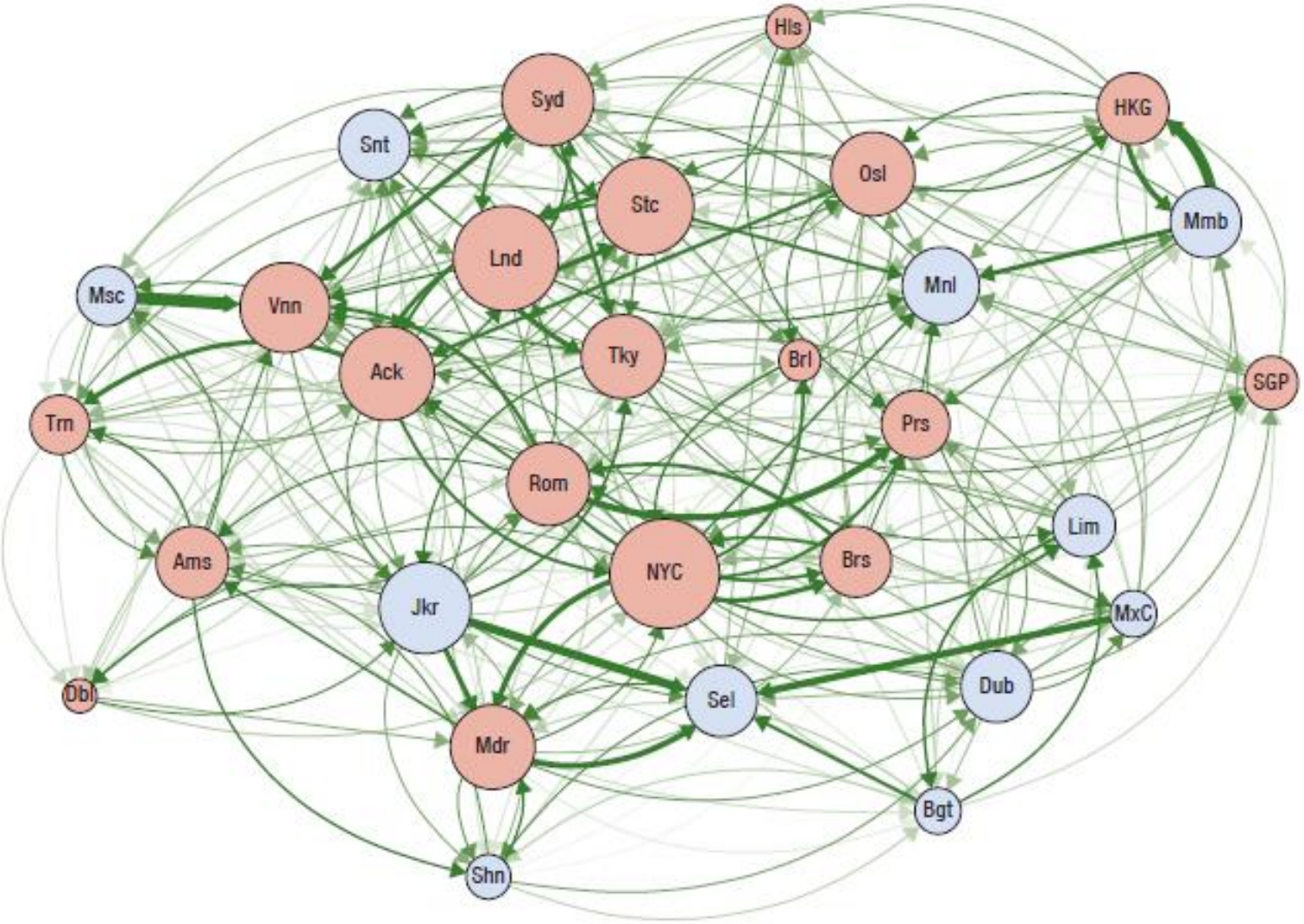
Conclusions

- **Key messages**
  - RRE markets important for financial stability
  - Risk analysis should look at a broad range of indicators and tools (i.e. beyond price dynamics and valuation)
  - Policy Analysis: the search for best practices is still on…
- **Open issues with the macroprudential analysis of RRE markets**
  - Calibration of instruments (Session 8)
  - Spillovers from RRE to the business cycle
    - Risk materialization in RE markets might lead to credit risks in other sectors of the economy and bank losses
    - Open issue: measurement of spillovers to inform the decisions on appropriate policies (i.e. capital surcharges for exposures on sectors at risk)
  - Cross border spillovers of risks and policies
    - Some countries are exporters of RRE risk other are importers
    - Cross border dimension of risks underestimated in policy setting by domestic policy makers (role for ESRB and ECB)

Cross border spillovers…

Figure 3.10. Interconnectedness among Cities' House Prices Varies



Source: IMF staff estimates.

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