

NBP

Narodowy Bank Polski

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Macroprudential Policy: tenants and tools

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The views are those of the author and not necessarily reflect the views of the Narodowy Bank Polski



Agenda

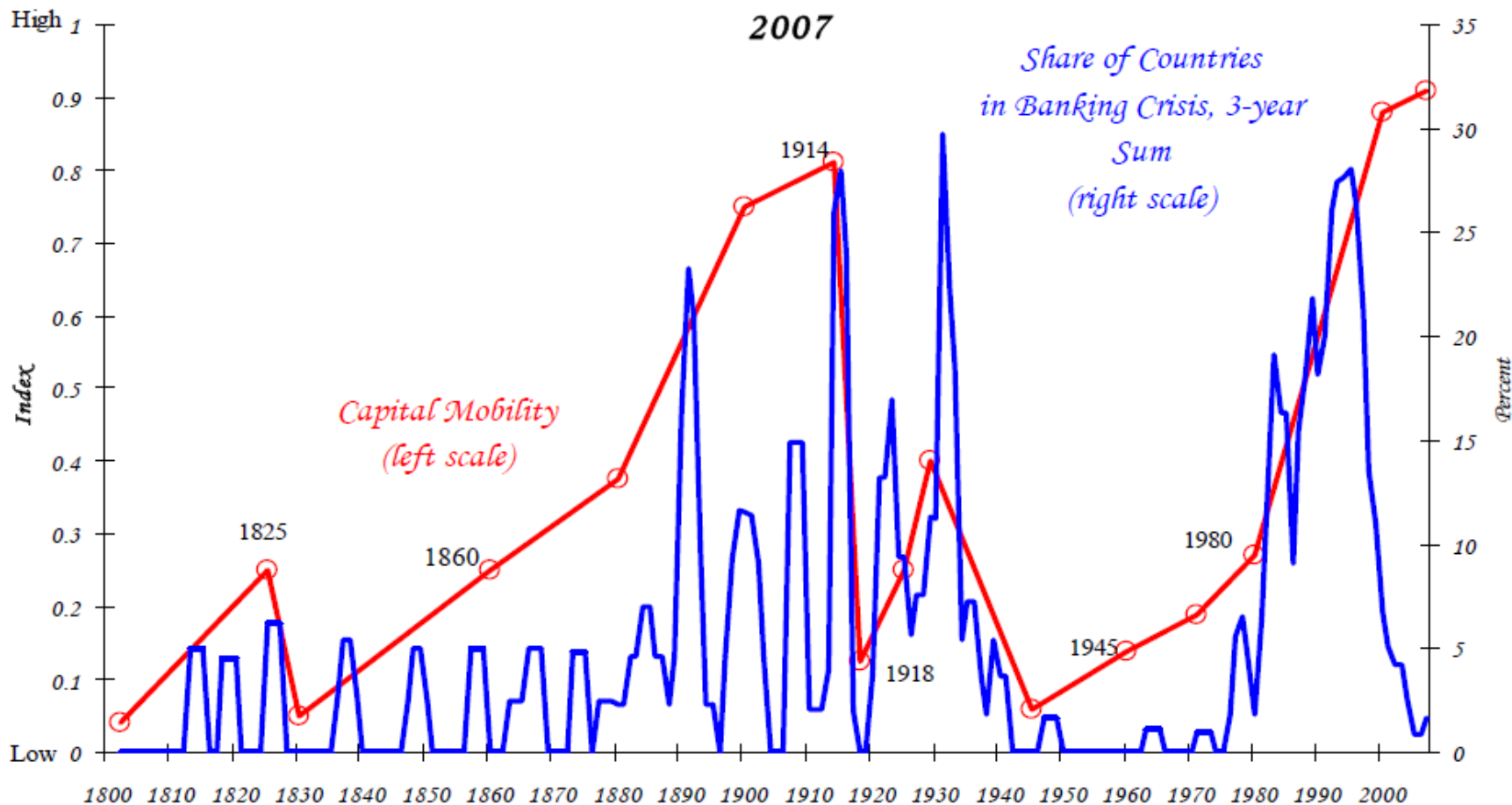
- **Tenants of macroprudential policy**
- **Polish experience**
- **Macroprudential and monetary policy cohabitation**
- **Conclusions**

1

Tenants of macroprudential policy

This time is not different

Capital Mobility and the Incidence of Banking Crisis: All Countries, 1800-2007



Source: Reinhart i Rogoff (2008), <http://www.nber.org/papers/w13882>

Not all sources of systemic risk should and can be tackled

Innovation

If we knew what it was we were doing, it would not be called research, would it?

Albert Einstein

Cognitive limitations

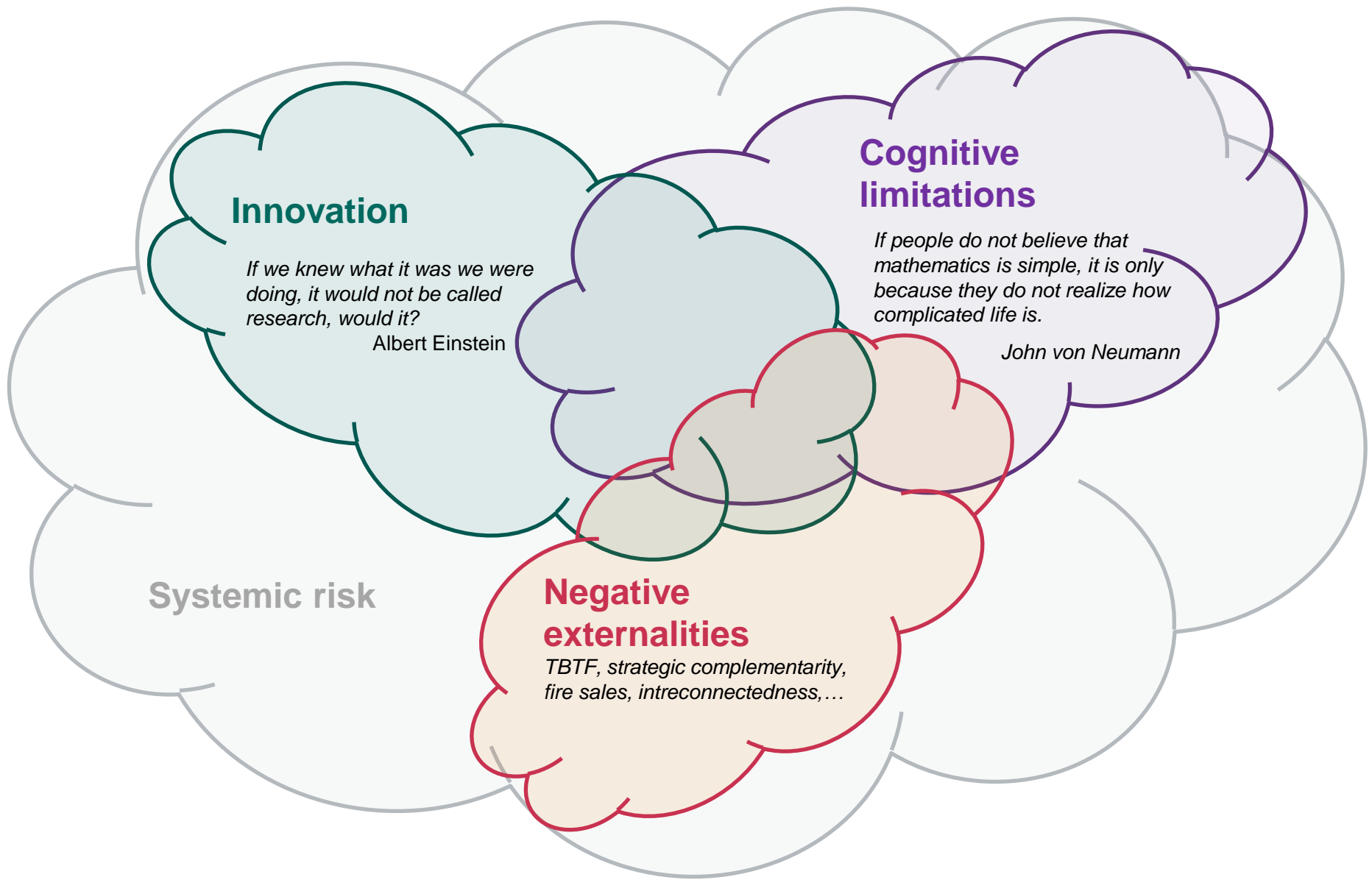
If people do not believe that mathematics is simple, it is only because they do not realize how complicated life is.

John von Neumann

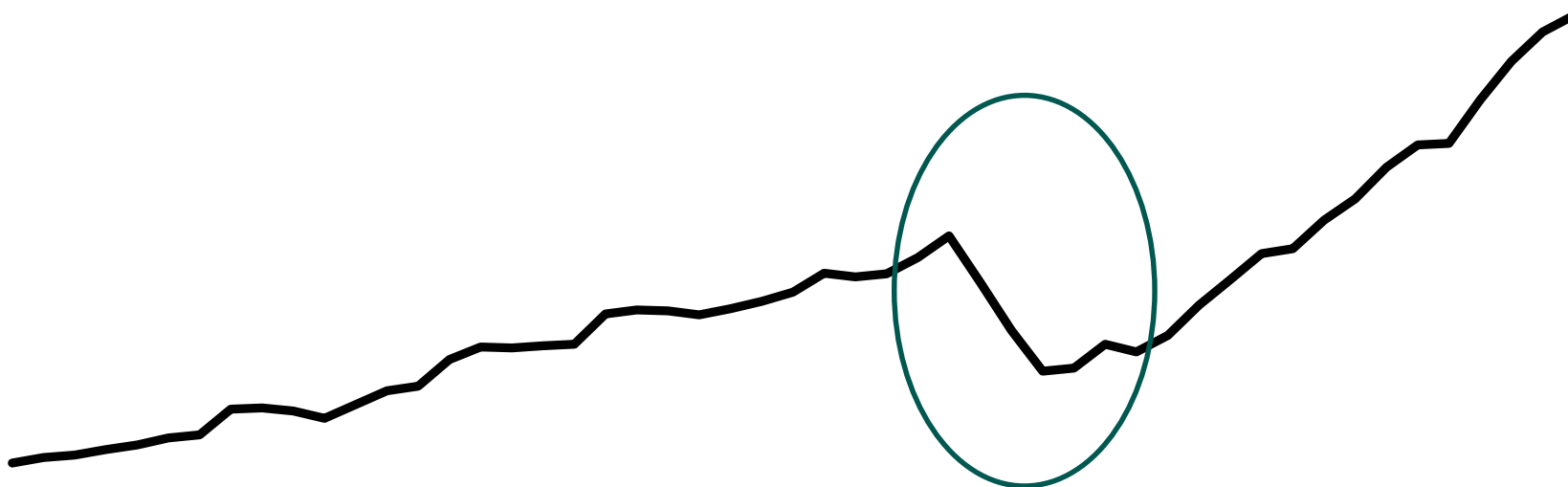
Negative externalities

TBTF, strategic complementarity, fire sales, intreconnectedness,...

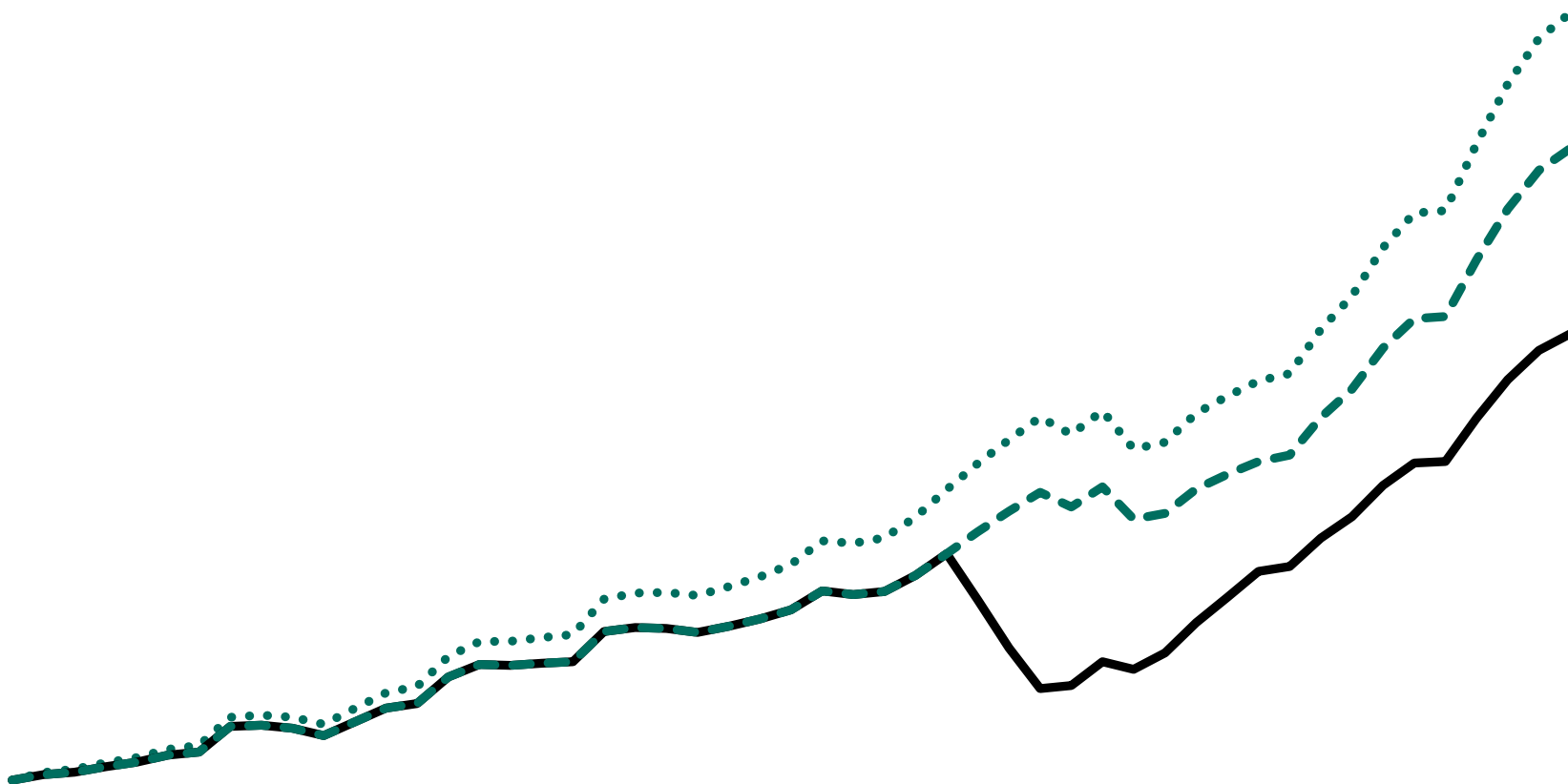
Systemic risk



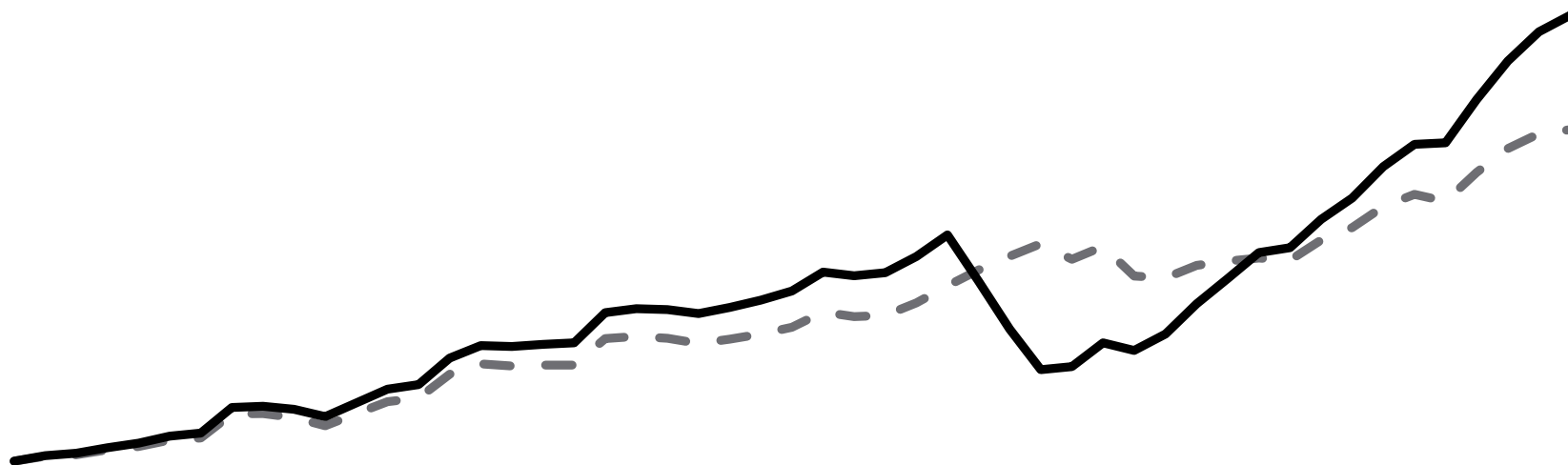
Macroprudential policy: Great Expectations?



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Macroprudential policy: Great Expectations?



Main tenants of macroprudential policy

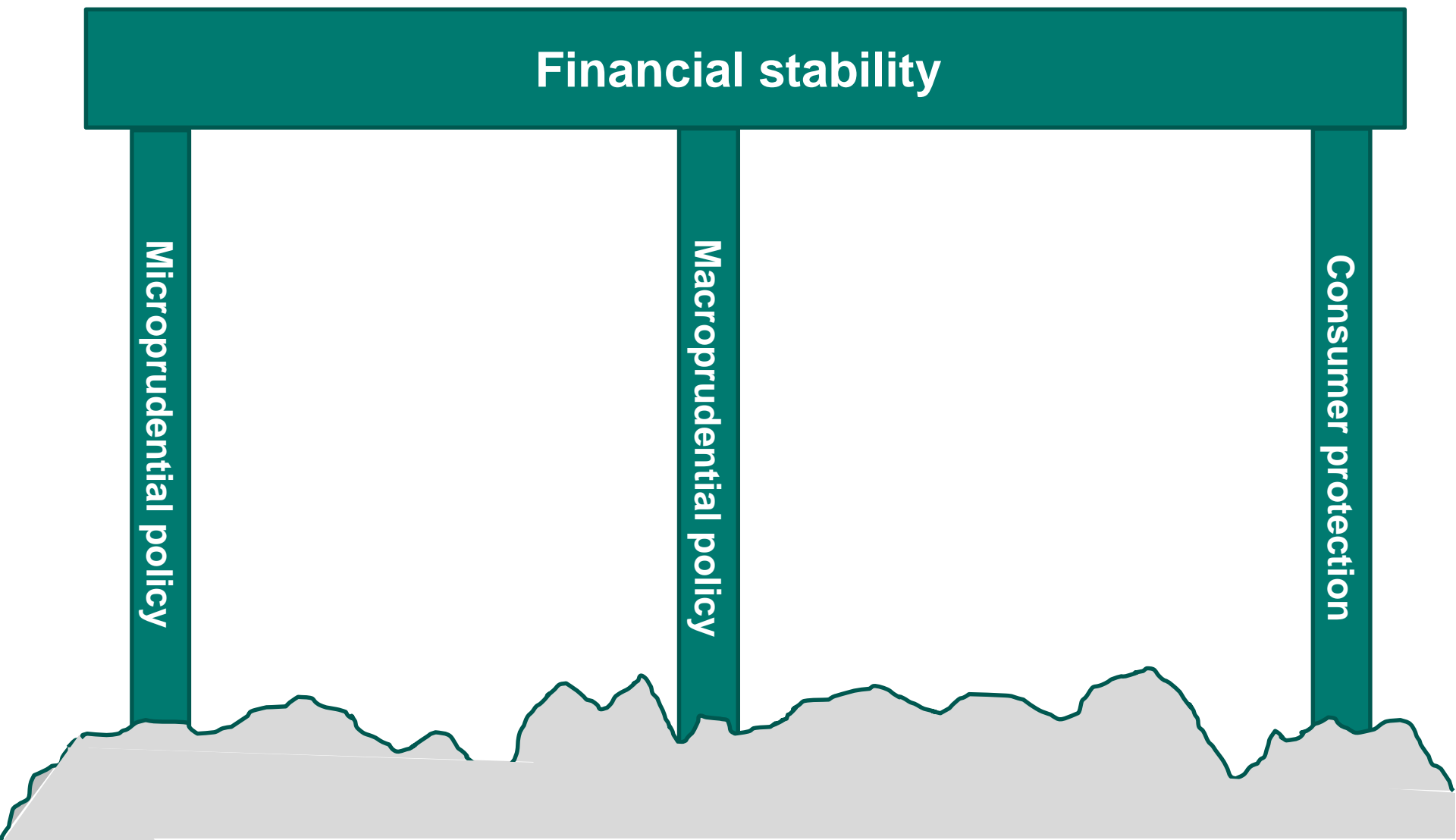
Primum non nocere:

- We should not try to substitute financial system in making of financial decisions in the economy,
- There is clear economic rationale for **targeting sources of negative externalities** (i.e. probability of crises decreases while the expected rate of growth increases),
- Response to **cyclical component of systemic risk** (which is usually related to expansion of credit) or **improvement in financial system resilience is justified** given the potential costs of crises, **but it is considerably more costly.**
 - Act preventively where the systemic risk is excessive,
 - We do not target certain level of growth of credit, nor we try to support the growth of credit by relaxing lending standards.

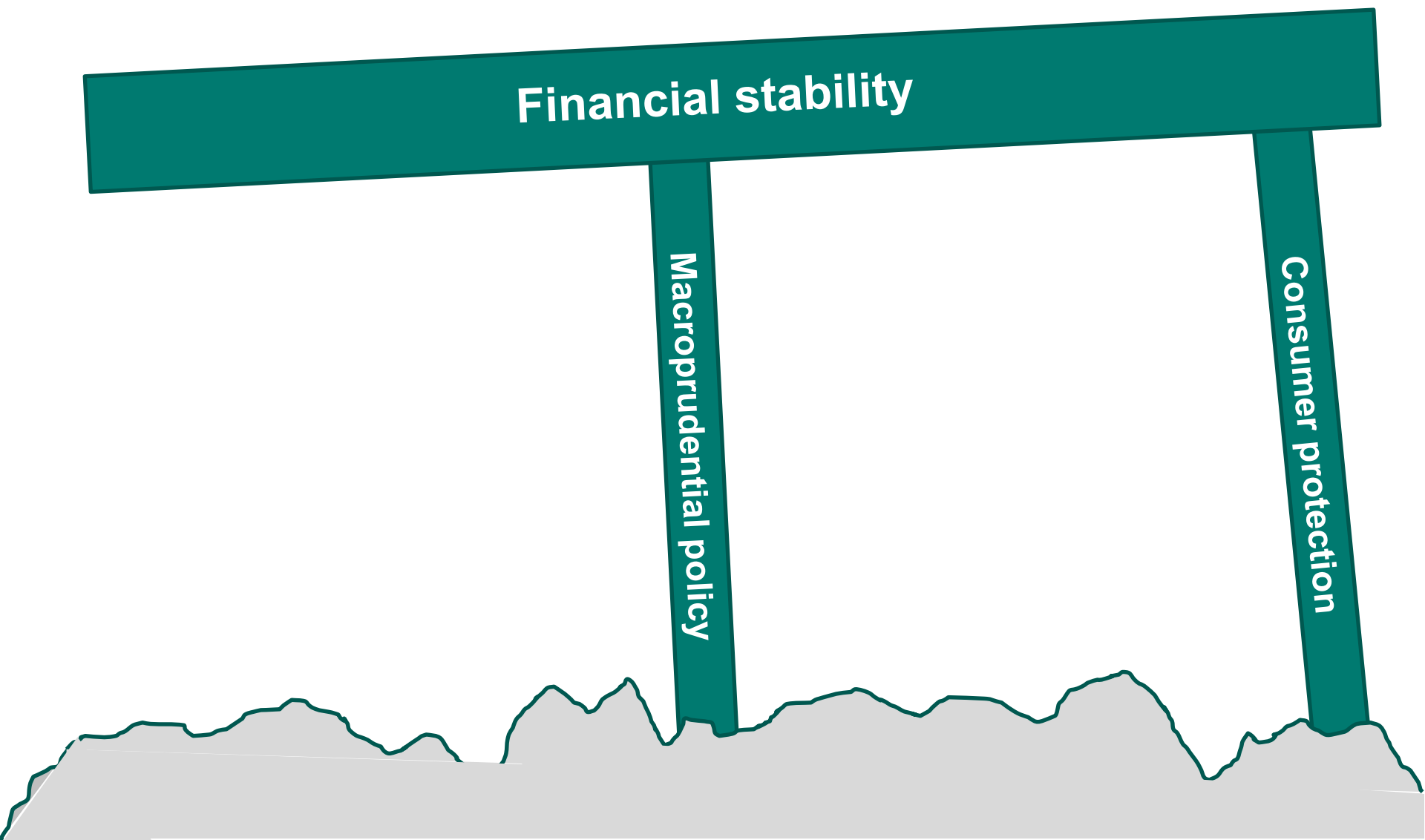
The list of instruments

- **Should be as short as possible**
 - Improves transparency and facilitates communication,
 - Decreases the risk of unexpected interaction between multiple instruments,
 - Facilitates the *ex post* analysis of effectiveness and therefore improves calibration.
- **Contemplated for use in Poland**
 - CRR/CR IV instruments (harmonised in the UE),
 - Most popular instruments used worldwide (e.g. LTV, DTI&DSTI, lending standards)

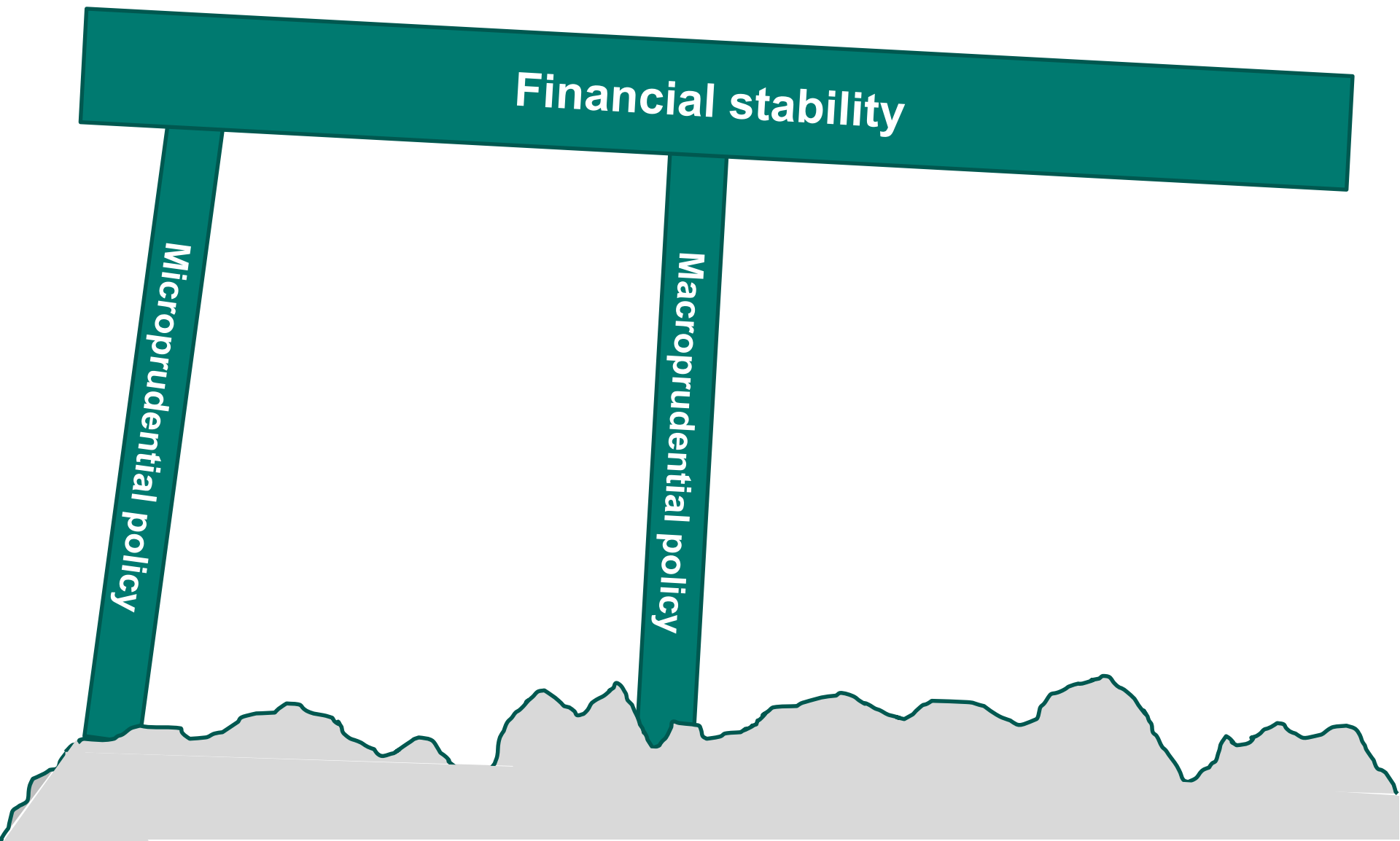
Pillars of financial stability – strong institutions



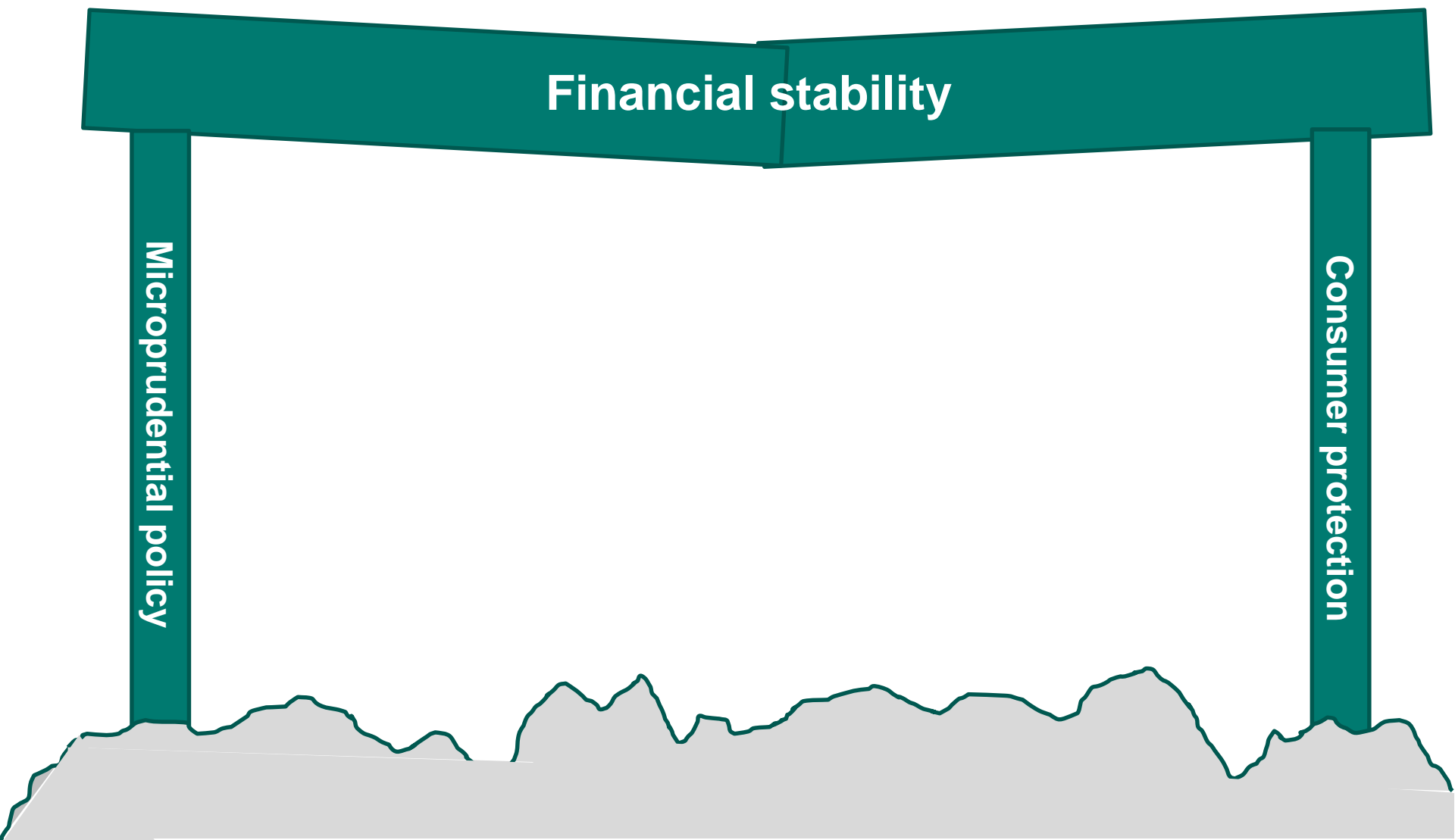
Pillars of financial stability – strong institutions



Pillars of financial stability – strong institutions



Pillars of financial stability – strong institutions



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Polish experience

Source of systemic risk	Dimension of risk	Intermediate objectives: mitigation of systemic risk stemming from	Instruments
Market failure: strategic complementarity	Cyclical	Growth or size of debt or leverage	<i>Credit availability:</i> LTV DTI & DSTI Lending standards
Knowledge: <i>animal spirits</i> , difficulty in estimation of risk			<i>Risk-bearing capacity:</i> CCyB Leverage ratio Sectoral requirements
Market failure: <i>fire sales</i>	Structural	Maturity mismatch of assets and liabilities or illiquidity of financial markets	LCR NSFR FSA liquidity norms M1-M4 <i>Haircuts and margins</i>
Market failure: <i>interconnectedness</i>			Concentration of exposures to entities or risk factors, and interconnectedness
Market failure: TBTF		Misaligned incentives	Capital buffers (O-SII, SRB) Leverage ratio Higher standards
Knowledge: difficulty in estimation of risk		Resilience of the financial infrastructure	Risk management rules at CCP Contingency plans for clearing and settlement systems

Choice of instrument

- **Adequate** for the given type of systemic risk
- **Effective** in addressing the systemic risk
- **Efficient** in terms of small cost and side-effects
- **Proportional** to the scale of systemic risk

Assessment of instrument

Qualitative analysis

- Pros and cons (economic and legal)
- Transmission mechanism
- International experience (calibration, application and evaluation in individual countries)

Quantitative analysis

Many models and many data sources to improve robustness

Methodology

- No holistic general equilibrium model available for comprehensive assessment
 - DSGE – theoretically appealing at providing holistic assessment, but suffer from simplifying assumptions and are not that relevant in practice
- Issue-by-issue (When? How much?) approach based on many non-GE models
 - **Sectoral and micro** (e.g. household, bank-level data) and **macroeconomic** (VARs)
- Currently more developed for cyclical systemic risk

Data

- Cross-country data
- Polish data

Examples

Calibration of Debt-Service-to-Income

Debt-Service-to-Income (DSTI) limits

- **One of the most popular measures of macroprudential interest**

- **Effective in affecting credit expansion**

(Lim et al., 2011, Claessens et al., 2014, Kuttner and Shim, 2013)

- **Effectiveness in curbing systemic risk and associated cost are not known**

- Whether credit is affected or not is not a measure of effectiveness, there are better tools to affect credit dynamics (i.e. credit limits).
- We propose economically sound method of measuring both the effectiveness and costs.
- Our method informs about the quality of DSTI as an macroprudential tools and provides coherent method for including decision-makers preferences concerning effectiveness and costs.

How good DSTI is in identifying over-indebtedness?

- **Two complementary indicators of households' over-indebtedness** (binary variables 0/1 – dependent variables):
 - **Income buffer** from microsimulation model based on household wealth survey
 - **Self-assessment** of indebtedness by households in the survey
- **DSTI as an explanatory variable**
- **Logit analysis based on ROC curve and AUC**

- **How can we use it?**

$$E(U) = P(FN \cdot \varphi) + (1 - P)(FP \cdot (1 - \varphi))$$

P: fraction of the „1” events
 Φ: relative weight of type I (FN) and type II (FP) errors

	Actual state: 1	Actual state: 0
Model result: 1	True Positive	False Positive <i>(type I error)</i>
Model result: 0	False Negative <i>(type II error)</i>	True Negative
	TP+FN	FP+TN

Optimal DSTI limits

for various sets of preferences regarding type I and type II errors

Relative costs of type II and I errors	3/1	2/1	1.5/1	1/1	1/1.5	1/2	1/3
Optimal DSTI (False Positive/ True Positive)							
Income buffer							
Shock: U, %, FX	14,8%	16,7%	23,7%	36,2%	36,2%	41,9%	41,9%
	(37,1/72,5)	(30,5/66,7)	(13,9/50,5)	(2,4/31,5)	(2,4/31,5)	(1,1/26,7)	(1,1/26,7)
Shock: U	9,2%	15,0%	27,1%	36,2%	36,2%	43,4%	57,4%
	(61,9/85,4)	(38,8/68,3)	(12,1/41,5)	(3,8/29,5)	(3,8/29,5)	(2/23)	(0,4/15,2)
Shock: %	14,8%	23,7%	23,7%	36,2%	36,2%	41,9%	42,4%
	(37,5/73)	(14,4/50,8)	(14,4/50,8)	(2,7/32)	(2,7/32)	(1,3/27,3)	(1,1/26,5)
Shock: % i FX	9,2%	15,0%	27,1%	36,2%	36,2%	43,4%	57,4%
	(61,9/85,4)	(38,8/68,3)	(12,1/41,5)	(3,8/29,5)	(3,8/29,5)	(2/23)	(0,4/15,2)
Self-assessment	18,2%	21,5%	37,8%	38,0%	Brak	Brak	Brak
	(30,9/62)	(24/53,9)	(7,5/26,4)	(7,4/26)	-	-	-

Examples

Cyclical systemic risk and the CCyB

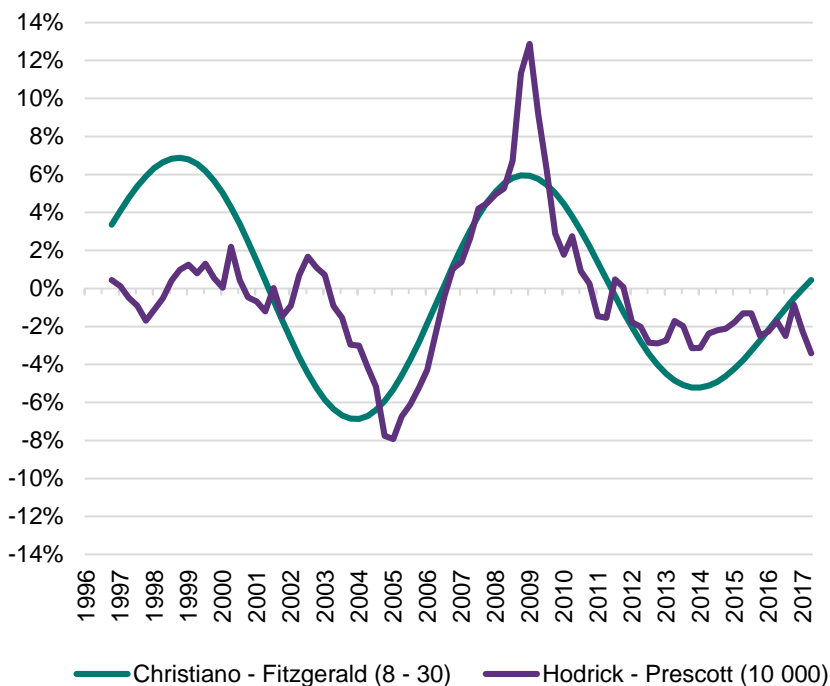
Countercyclical capital buffer



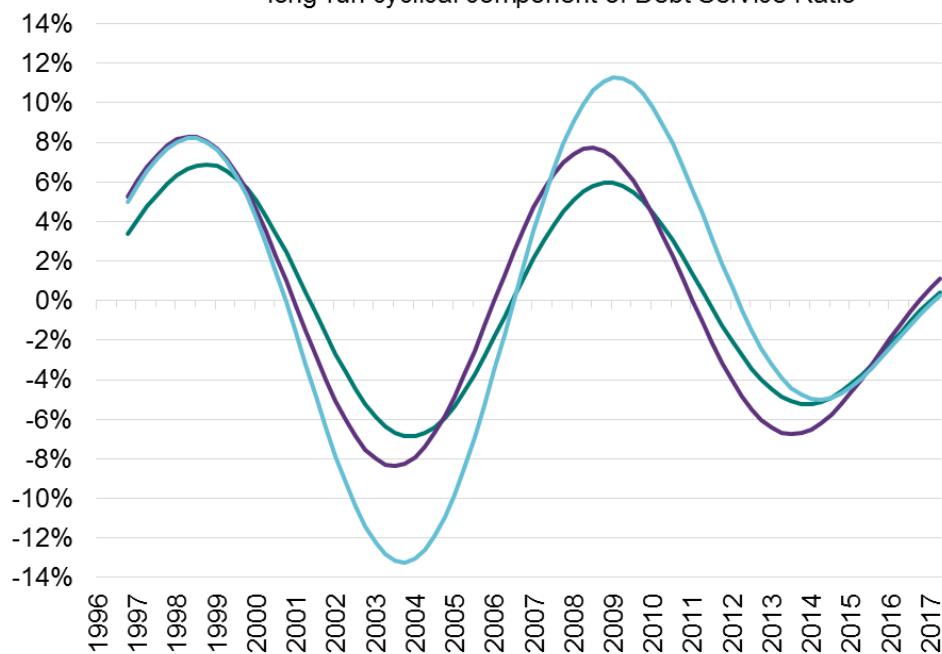
- **The standard approach recommended in Basel III and UE law attaches special weight to the credit gap, assuming certain characteristics of the financial cycle:**
 - CRD IV, article 135 and 136: The buffer guide shall reflect the credit cycle and the risks due to excess credit growth in the Member State. It shall be based on the **deviation of the ratio of credit-to-GDP from its long-term trend**.
 - ESRB/2014/1: a benchmark guide extracts trend with HP filter and $\lambda = 400\,000$, implying that **financial cycle exceeds 20 years**.
- However, it is not clear that:
 - **length of the financial cycle in all countries indeed exceeds 20 years,**
 - **a single variable** is a satisfactory indicator.

Recovery phase of the cycle

Cyclical component of credit/GDP

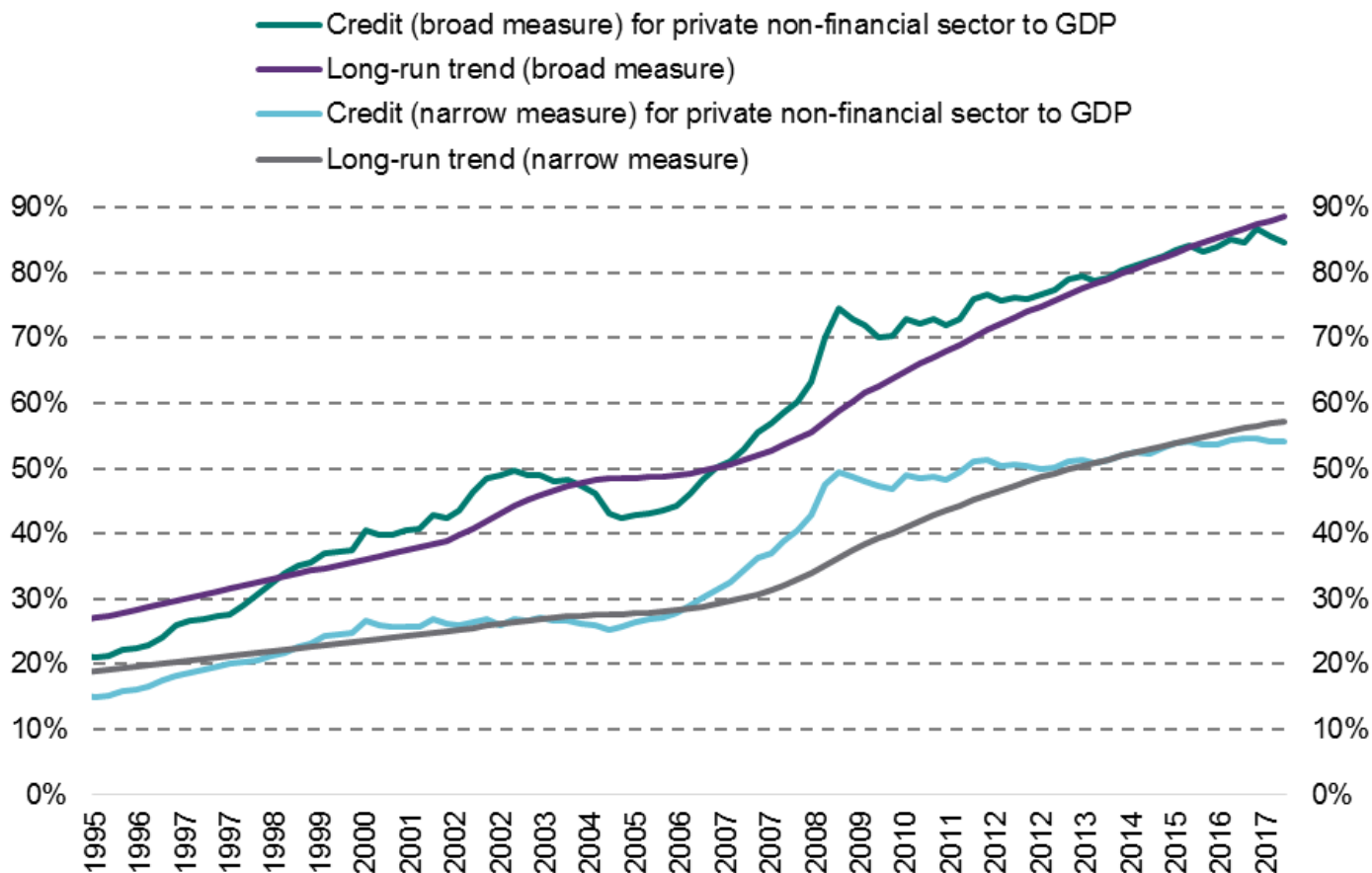


— long-run cyclical component of credit to GDP
 — long-run cyclical component of credit growth
 — long-run cyclical component of Debt Service Ratio



Source: own calculations based on NBP, BIS and GUS data.

Credit gap is negative



Source: own calculations based on NBP, BIS and GUS data.

Early Warning Model: which variables that should guide us - one or many?

- Early warning model (logit):
- Pooled model (can be directly used by any country), yet with country-specific information (variables transformed with z-score for each country).
 - **47 countries** (UE and the non-UE BIS data).
 - 1970 – 2014 (when available)
 - 11 explanatory variables and their transformations (levels, dynamics, deviations from trend).
 - **Macro:** credit, credit/GDP, GDP, DSR, Residential prices, Residential Ptl, **Financial sector's value added**
 - **Financial:** Banking sector beta and volatility, TED spread, VIX.
- Compare models with 1, 2 and 3 explanatory variables
- Best model choice based on AUROC (AUC) and stability of performance (out-of-sample)

More variables, better signals

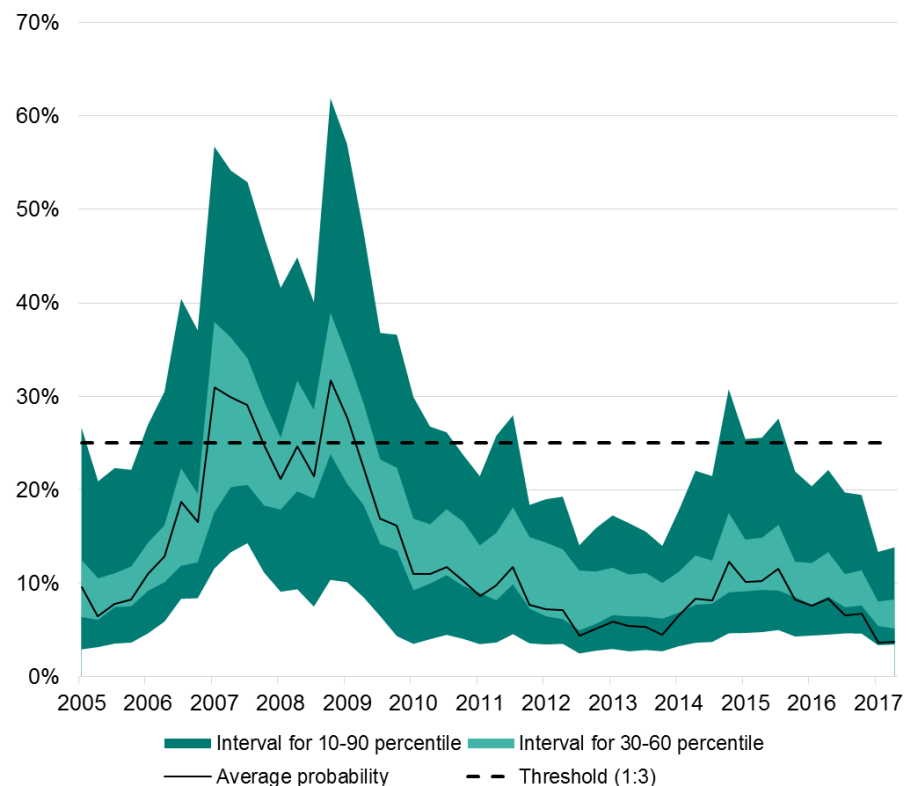
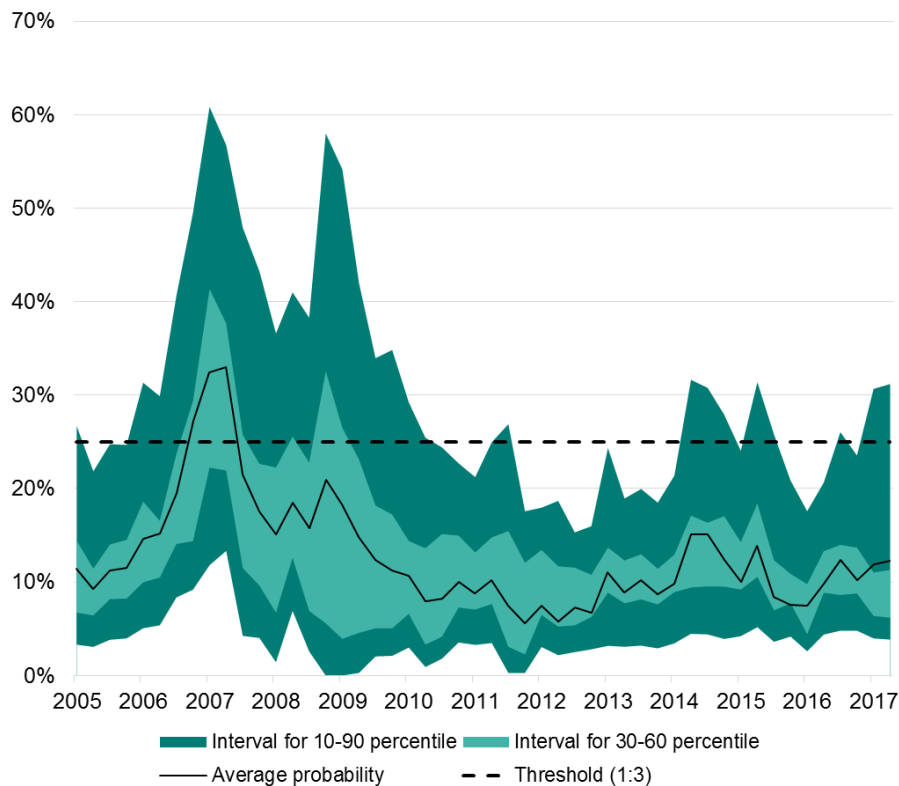
- More variables provide better signals than one variable
 - AUC of 0.75 for the best single-variable vs. 0.92 for 3-variable model
 - Significantly better signal than pure credit gap (AUC of 0.63)
- Credit gap is good, but not the best
 - VIX, Credit growth, Financial sector's share in Value Added
- Beware of the high growth in the *measured* value added of the financial sector

Model	AUC
3 variables (including global): VIX, DSR, Ptl	0.92 [0.90-0.93]
3 variables (only local): Value Added, DSR, Ptl	0.86 [0.82-0.89]
VIX	0.75 [0.72-0.77]
Credit ($\Delta 16q$)	0.73 [0.71-0.76]
Value Added ($\Delta 16q$)	0.69 [0.67-0.72]
Credit gap	0.63 [0.59-0.66]

Note: Regression results based on 47 countries, 1970-2014. DSR - Debt Service Ratio in the economy, Ptl - Price-to-Income Ratio for residential real estate, Value Added ($\Delta 16q$) – 16 quarter growth of financial sector's share in value added, Credit ($\Delta 16q$) – 16 quarter growth of credit to private non-financials

Source: Bańbuła and Pietrzak (2016)

Probability of banking crisis in Poland



Source: own calculations based on NBP, BIS and GUS data.

Examples

The impact of LTV limits on credit

LTV limits in Poland and in the UE

Calibration	Poland	Other UE countries*
Limit	2014: 95% 2015: 90% 2016: 85% 2017: 80%	Usually 80-90%, but there are lower limits as well
Cyclical	Stały limit	Some countries declare that the limits will vary across the cycle (EE, FI, HU, NO, SK)
Exemptions	90%, if the credit is collateralised/insured	Common exemptions: <ul style="list-style-type: none"> • Insured credit, • First-time buyers, • Part of the portfolio need not comply (10-15%).
Nominator	Credit exposure, including credit lines	Most countries includes all exposure, some only given credit (LT, NL, NO, RO, SK)
Denominator	Market price of real estate	Usually market price, sometimes the lower from market and transaction process (IE, NO)

* Based on ESRB survey from early 2015.

How the LTV limit has affected credit in Poland in 2014? How will it affect it in future in 2017?

- Three complementary models:
 - **Macro model (Bayesian VAR):**
 - Allows to assess the impact of LTV limits on credit and other variables in the economy,
 - Allows to simulate the impact of tighter limits in 2017,
 - Does not account for banks' policies,
 - Does not account for structure of credit portfolio.
 - **Micro model for banks (panel):**
 - Allows to assess the impact of LTV limits on credit while accounting for banks' policies,
 - Does not allow to simulate the impact of tighter limits in 2017,
 - Does not account for structure of credit portfolio.
 - **Mico model for households (simulation based on household level data):**
 - Allows to assess the impact of LTV limits on credit availability while accounting for structure of credit portolio in years 2009-2013 and the situation of individual households in 2014,
 - Does not account for banks' policies.

Impact of LTV limits on credit: model results

Model	Macro model	Micro-banks	Micro-households
Current impact (in 2014 r.)	Statistically insignificant	Statistically insignificant	- (2%,8%)
Expected impact (in 2017 r.)	- (16%,27%)	N/A	- (19%,28%)

Source: own calculations.

Note: the results show the impact on the level of new credit compared with situation without LTV limits.

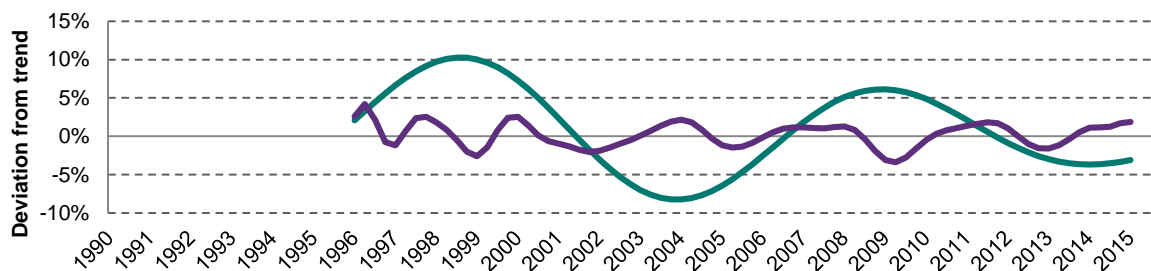
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Monetary and macroprudential cohabitation

Monetary and macroprudential cohabitation

		Financial cycle		
		Expansion	Crisis	Contraction
Business cycle	Expansion	% ↑ Macropru ↑	N/A	% ↑ Macropru ↓ or ~
	Contraction	% ↓ Macropru ↑ or ~	% ↓ Macropru ↓	% ↓ Macropru ↓

Financial and business cycle in Poland



Note: GDP and credit/GDP cyclical components based on C-F band-pass filter (1-8Y for business cycle and >8Y for financial cycle).

- Concordance between monetary policy stance (measured by Taylor rule) and macroprudential stance (measured by credit gap) is close to 60%, but in reality conflict would arise in less than 15% of time.

Monetary and macroprudential cohabitation

- Financial and business cycles differ
 - The conflict would arise rarely.
 - Both policies can still act towards their main objective.
 - Information concerning impact of macroprudential policy on the economy and on the transmission mechanism of the monetary policy should be included in monetary policy decision making (and vice-versa).
- Credibility of joint responsibility for both policies at central banks
 - Inflation is observable, systemic risk is not – which will have an upper hand?
- Reputational challenge
 - High inflation is an indication of monetary policy failure.
 - Crisis is not necessarily an indication of macroprudential failure (or macroprudential is bound to fail), but may be perceived as such.

Conclusions

- **Be humble (but bold)**
 - We still know very little about macroprudential instruments.
 - There is risk of stifling growth with macroprudential measures, but failure to act can be very costly.
 - Target externalities and act preemptively based on a sound analysis.
- **Good analytical tools will translate into better policies**
- **Macroprudential authorities will inevitably have a crisis on their record**
 - Crisis is not necessarily a sign of failure, some failures are bound and should happen (innovation, cognitive limitations).
 - This is particularly challenging for central bank's reputation and the impact of monetary policy.
 - Communicate the objective and the challenges in advance.