Central Bank Communication on Financial Stability:

AI text analysis of Financial Stability Reports

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Motivation

- Financial stability/macroprudential policy is critical for central banks, but its communication is under-researched
- This is a problem because financial stability is an objective of most central banks and is a systemic issue (GFC 2008/9)
- Problems can also arise from uncoordinated monetary policy and financial stability objectives (Spring 2023 in the US)
- We aim to address this research gap using AI text mining tools

Objectives

- Main objective: assess central bank/competent authority's communication on financial stability/macroprudential policy
 - Focus: Financial stability sentiment analysis
 - Assess communication consistency between a home supervisor (Austria) and host supervisors (Visegrad 4)
- Further objectives (only preliminary views at this stage!)
 - Assess whether communication is related to policy action (drawing on Eller, Martin, Schubert, Vashold 2019, 2021)
 - Compare communication on financial stability and monetary policy, drawing on earlier research on central bank communication in EMs, Fed and ECB (Evdokimova, Nagy Mohacsi, Ponomarenko, Ribakova 2023)
- Start with a small group of countries to test methodology

Financial stability communication is a hard nut to crack...

- Relative to analysing communication on monetary policy, communication on financial stability is harder (BIS 2016):
 - No agreed *definition* of what "financial stability" is
 - No quantitative target as in inflation targeting
 - Relatively new *framework* still evolving since the GFC 2008/9
 - Financial Stability often competence of more than one authority
 - Public appreciation of financial stability risk may be different from central bank communication ("why worry when times are great and asset prices are booming"?)

Main objective - Methodology

Step 1: We identify key financial stability concerns : banking sector resilience; commercial real estate; domestic economic developments; global economic developments; household indebtedness and residential real estate; sovereign risks; and other.

Step 2: We ask ChatGPT to assign a topic to each sentence of FSR executive summaries (ES). This gives us the 'structure' of the ES by topic (shares sum up to 100%).

Step 3: We identify the sentiment of the FSR ES for each topic. To this end, we take the sentences belonging to each topic and identify the sentiment of these sentences.

Step 4: We sum up the sentiment scores for each topic, which gives us the *overall* sentiment conveyed by the central bank on financial stability and its contribution by topic.

Step 5: We undertake a robustness check based on traditional dictionary method, using the Correa et al (2021) methodology *(results in the appendix due to time constraints)*.

Country coverage and data

- Austria: 2001 2024 (central bank; we checked but excluded documents by other regulators such as Financial Stability Board)
- Czechia: 2005 2024 (central bank)
- Hungary: 2000 2024 (central bank; structural break in 2013)
- Poland: 2003 2024 (central bank; but multiple regulators)
- Slovakia: 2004 2024 (central bank)

Main objective – Financial Stability Communication

FSR Decomposition (Steps 1 and 2)

Approach

We use ChatGPT to assign a topic to each sentence of FSR executive summaries. To this end we use the following prompt:

"You are a Financial Stability Expert focusing on macroprudential policies. In this role you assess systemic financial stability risks and provide specialized insights and guidance on maintaining financial stability through a range of regulatory measures. You are able to interpret central bank communication in Financial Stability Reports with clarity and precision. You will get sentences from financial stability reports for Poland. Please assign a topic to each sentence selecting the topic from the following list: "Global economic or market developments", "Household indebtedness and residential real estate market", "Banking resilience", "Commercial real estate", "Sovereign and geopolitical risks", "Domestic economic developments", "Other". Use category "Household indebtedness and residential real estate market" when the focus of the sentence is household financing. Sovereign risk is determined by the public finance situation and creditworthiness of the government. "Global economic or market developments" category refers to dynamics of world economy or international financial, commodity or exchange rate markets. To qualify for category "Commercial real estate" the sentence should explicitly refer to commercial use of property. The category "Banking resilience" is broad and should include sentences describing banking sector developments, risks, bank lending trends (if not included in the category about households and commercial real estate), balance sheet. Identify only one core topic for each sentence and assign it. Please answer with the topic using the following model "Topic: ...". Use category "Other" sparingly. Here is the text:"

FSR executive summaries topic decomposition



Some common patterns

- Executive summary content dominated by discussion of banking sector resilience (fully understandable given banking sector dominance in the region)
- Growing emphasis on household indebtedness
- Declining emphasis on domestic economic developments (a surprise)
- Declining emphasis on global markets and economic developments in recent years (this may change going with the new US administration's volatile policies)
- Relatively larger share of communication on sovereign risk during euro area sovereign debt crisis and the pandemic.

Main objective – Financial Stability Communication

Chat-GPT based sentiment analysis (Steps 3 and 4)

Approach

- We take all sentences belonging to key financial stability topics
- Each sentence within each topic is classified into more (1) / less (-1) concerned about financial stability or neutral (0) using ChatGPT

Prompt: "Please analyze the provided sentences. Assess the sentiment communicated in the sentence that you analyze. Does it convey concerns of the regulator or market participants regarding the situation on the global financial markets or in the world economy/main partners? Or does it provide an optimistic description of the market developments and economic conditions as viewed by the regulator or investors? Sentences implying overvaluation of assets should be treated as conveying more concerns. Sentences highlighting accumulation of risk or increased probability of risks materializing should be treated as conveying more concerns. When a sentence mentions stimulating policy measures without which the economy is ailing, treat the sentiment of this sentence as negative since the need for the measures implies economic challenges and weaknesses. When a sentence is generic we treat it as "unclear" sentiment. Use "unclear" sparingly. Take the information from preceding sentence for context, it is often useful for assessing the sentiment. Answer "more concerned", "less concerned" or "unclear" and provide your reasoning. Here is the text:"

- Prompts are different for each topic
- Preceding sentence from FSR executive summary given to ChatGPT for context

Approach (cont.)

- Scores of all sentences belonging to the same topic are summed up for each report
 - High/low score implies that sentences conveying more/fewer financial stability concerns dominate
 - Scores close to zero can reflect either a neutral sentiment of most sentences or positive sentences being offset by negative
- Overall score for each topic in a given FSR report is normalized by the total number of sentences in the FSR executive summary
- The financial stability index varies from -1 (low financial stability concerns) to 1 (high financial stability concerns)

Sentiment by topic over the full period



- Sentiment across topics predominantly negative (except for banking resilience)
- Most external factors in "Sovereign and geopolitical risks" and "Global economic or market developments" communicated as source of risk
- Relatively large share of ambiguous statements on banking resilience

Evolution of financial stability sentiment over time across components



Key trends

- Sentences reflecting concerns dominate the communication across topics and periods (*maybe characteristics of macropru comms*)
- GFC and Eurozone crisis are the periods with the highest level of concerns
- After GFC, share of positive communication never recovered to pre-GFC levels
- Concerns about commercial real estate are now at historical highs
- The pandemic did not trigger a significant worsening of the overall financial stability sentiment likely thanks to:
 - Confidence in banking sector resilience underpinned by implemented post GFC prudential policy measures
 - Major fiscal and monetary stimulus and macropru relaxation able to mitigate potential adverse effects of the crisis on borrowers' creditworthiness

Hungary



Czechia





- Limited concerns before GFC, but since then relatively high net concern
- During GFC, focus on risks driven by global economic and market developments
- Rising concerns about household debt during period of low interest rates
- Apart from the GFC and pandemic periods, no major concern on banks
- Recent concerns over commercial real estate
- Increased concerns about sovereign and geopolitical risks after the pandemic

Slovakia





- Heightened net concerns during most of the period (similarly to Czechia)
- Around the GFC and its aftermath, concerns driven by banks, but this concern relaxed from 2011
- Concerns elevated prior to the pandemic, driven by bank resilience and household indebtedness issues
- Sentiment gradually relaxed since 2023 towards neutral level, driven mainly by positive bank sentiment
- Recent concerns about commercial real estate (as in Czechia)

Poland





- Generally, more volatile communication sentiment.
- Very positive risk sentiment before the GFC, driven by bank resilience. Some concerns about households.
- After GFC: fast relaxation in risk sentiment, driven by bank resilience (*Poland withered GFC quite well*).
- Sharp rise of risk sentiment at start of Covid, mainly driven by bank resilience concerns,
- Recent return to neutral sentiment.

Austria





- Pre-GFC very positive risk sentiment, driven by bank resilience and positive global outlook (unlike V4)
- Around GFC, strong increase in risk sentiment, driven by global outlook and bank resilience
- Renewed concerns around euro area sovereign debt crisis
- Some increase of concern during pandemic but less than in V4 or under GFC
- More financial stability attention to CESEE region after the GFC (*next slide*)

References to CESEE countries in OeNB FSR executive summaries



Risk sentiment in V4 (average) and Austria

Financial stability sentiment Austria vs Visegrad 4 countries



- Risk sentiment in Austria generally more positive than in V4 (except GFC and EA sovereign debt crisis)
- Very relaxed/positive sentiment pre GFC and before Covid
- Is there coordination of communication between home-host?

Summary of FSR sentiment patterns

- Pre-GFC, some financial stability concerns communicated in Hungary, Czechia, Slovakia and (late) in Poland, not in Austria.
- During GFC substantial worsening everywhere, driven mainly by global economic meltdown and risks to banking sector
- Post-GFC some easing but generally net negative risk sentiment until after the eurozone sovereign debt crisis
- Pre-Covid, stronger concerns in CEE than in Austria; especially in countries with strongly increasing household debt and 'hot' residential real estate markets – Czechia and Slovakia
- Overall post-GFC reduction of concerns about banks, as new micro- and macroprudential measures were introduced
- Post-Covid/energy crisis/Russia war: significant financial risk concerns communicated in Poland, Czechia, and Hungary, less in Austria. Slovakia inbetween (elevated concerns maintained).

Further objective 1

Financial Stability Communication and Policy Action

See – Say – (Act)

Macroprudential policy index (approach)

Most literature on macroprudential policy captures only extensity, i.e. occurrence of macroprudential policies, using very simple indices

- Binary indicators measure in place or not?
- Tightening / loosening / ambiguous measures given + / 1 or 0
- Some studies cumulatively sum up tightening / loosening measures over time (e.g. Shim et al. 2013, Ahnert et al. 2018 or Alam et al. 2019)

Eller, M. et al. (2020) take an intensity-adjusted approach to assess the 'macroprudential stance' in CESEE countries

- Broad set of instruments
- Data for the 11 CESEE EU Member States, mostly starting in 1997q1
- Distinction between announcement and implementation of measures
- Capturing both legally binding acts and recommendations

Macroprudential policy index (structure)

Components of the macroprudential policy index (MPPI)



Bank resilience and capital buffers in V4



28

Household indebtedness and borrower-based measures





Preliminary findings

- The link between financial stability communication and macroprudential policy action is complex
 - Increased concerns may foreshadow action
 - Communication may not be desirable in some cases to avoid 'front-loading'
 - Policy action (if successful) may reduce concerns
- Our two sample charts suggest
 - In some countries we see the link between increasing bank resilience concerns and the introduction of capital measures and / or the reduction in concerns following their introduction
 - In some countries we see a link between household indebtedness concerns and the introduction of borrower-based measures.
 - Once measures are in place, they tend to become 'sticky', especially borrower-based measures. In Czechia, the volatility of measures seems more pronounced.
- To be continued....

Further objective 2

Financial Stability and Monetary Policy Communication

Financial stability vs monetary policy sentiment



Some very tentative observations (1)

- Central banks are generally more cautious on financial stability/macropru than on monetary policy, for obvious reasons
 - There may be a built-in higher risks sensitivity
- In theory, financial stability policy needs to tighten in the "boom" part of the cycle ie., when things seem to go well but risks are building up under the surface. When risks materialise policy needs to loosen. Is this borne out by data/analysis?
 - Results may reflect that macropru is truly developed post GFC and communication reflects the evolution of new measures
 - First real test of consistency therefore is the post-Covid inflation period. In **US**: inconstancy feeding to the mid-size bank crisis of March/April 2023

Some very tentative observations (2)

- In Hungary post-Covid monetary policy concerns with rising inflation appear to be followed by concerns on financial stability -> seems consistent.
- In Czechia financial stability concerns dominate the period, with no clear link to monetary policy/inflation developments
- In **Poland,** similarly. Comms on monetary policy is particularly volatile around Covid/political cycle
- In the two Euro area members Austria and Slovakia, mon pol sentiment is communicated by the ECB and financial stability by the national authorities (too). We see national fin stab concerns increase (A) or remain elevated (S) around Covid as inflation rises in 2021/22 even-though the ECB/monetary policy is still not concerned. (*This is really interesting!*)

Tentative Conclusions

Tentative conclusions (1)

- Financial stability gained in importance since GFC, and so has the role of communication on financial stability
- Analytical work on financial stability communication is, however, still a rather new field; much less developed than e.g. work on monetary policy communication
- Communicating on financial stability is complex; many dimensions and many policy tools
- Central banks may see a risk of 'self-fulfilling prophecies' when communicating financial stability concerns. At the same time, Type I and Type II errors can be costly.
- Pre-GFC, some financial stability concerns communicated in Hungary, Czechia, Slovakia and (late) in Poland. Less so in Austria, despite its role as home country for key regional banks.
- During GFC substantial worsening, driven by global economic meltdown and banking sector
- Post-GFC easing concerns, especially regarding banks, as new micro- and macroprudential measures were introduced.

Tentative conclusions (2)

- Stronger post-GFC concerns in CEE than Austria, however, Austria communicates more on CEE post-GFC.
- Covid pandemic did not trigger a massive *worsening* of financial stability sentiment, likely due to confidence in banking sector and policy support
- But sentiment worsened in Poland, Czechia and Hungary around 2022 (energy crisis, Russia war); in Slovakia it remained moderately elevated
- Going forward, we would like to look at two follow-ups
 - The link between financial stability communication and macroprudential policy action
 - Very preliminary observations suggest that there are links between communication and policy but it's a complex field
 - Communication as 'early warning' or indicator of policy effectiveness
 - The relationship between communication on financial stability & monetary policy since GFC
 - Macropru was developed in this period and sentiment communication likely reflect that, and perhaps less so monetary pol developments particularly in disinflationary contexts
 - First real test of consistency is the post-Covid inflation period. We know that in US communication on mon policy tightening and financial stability was not fully consistent (Spring 2023 mid-bank size crisis). Needs further work for V4.

THANK YOU!

Annex

Literature (1)

- Early paper by Committee on Global Financial System (CGFS) on central bank communication on macroprudential policy (BIS 2016) point to 3 obstacles:
 - Lack of agreed definition of financial stability. Partly as a result, there is no quantified target.
 - Lack of a clear analytical framework for macroprudential policies.
 - Political-economy type problems due to the public's low level of policy awareness or outright misconceptions about financial stability risks.
- Wischnewsky, Jansen and Neuenkirch (2019) investigate interaction btw monetary policy & financial stability in US before & during GFC. They construct indicators for financial stability sentiment (FSS) from testimonies of four Federal Reserve Chairs at Congressional hearings. They find that negative FSS coincided with more accommodative monetary policy stance than implied by the Taylor- rule.
- Born, Ehrmann and Fratzscher of the ECB (2011) analyse the effectiveness of three major forms of central communication (FSRs, speeches and interviews) on financial sector stock market returns. Building on a unique dataset of 37 central banks in 1997-2009, they find that FSRs have a significant long-lasting effect on fin. sector stock returns:
 - FSRs move equity markets by more than 1% during the subsequent month.
 - FSRs also reduce noise, as market volatility tends to decline in response to FSRs. These effects are particularly strong if the FSR has an optimistic assessment of the risks to financial stability. In contrast, they have little effect on market returns before 2008/9 but had substantial effect during GFC.

Literature (2)

- Correa, Garud, Londono and Mislang (2021) analyze the relation between the FSR sentiments and the financial cycle. They construct a dictionary tailored to financial stability & construct financial stability sentiment (FSS) indexes for 30 countries in 2005-17. They find that
 - central banks' fin. stability communications *driven* by developments in the *banking* sector;
 - deterioration in FSS is followed by monetary policy easing;

- deterioration in FSS is followed by worsening financial market indicators (asset prices, credit etc);

- FSS in central bank communications is a useful *predictor* of banking crisis: a 1 pc point increase in FSS is followed by a 29 percentage point increase in the probability of a crisis.
- Eller, Martin, Schubert and Vashold (2019 and 2021) analyse macroprudential policies in CESEE. They develop an intensity-adjusted index of macroprudential policies in the CESEE between 1997-2021. We use their index EMSV in our work in multiple ways.

Robustness check: dictionarybased financial stability sentiment (Our Step 5)

Approach

- We apply the dictionary created in Correa et al. (2021)
- To the right is a sample of the full dictionary (96 positive and 295 negative words)
- Sentiment is calculated using the following formula

 $FSS \ index_{country, period} = \frac{\#Negative \ words - \#Positive \ words}{\#Total \ words}$

- Higher index value means more negative sentiment (more anxiety)
- Results of the two approaches are remarkably similar!

Word	Positive	Negative
able	1	
abnormally		1
abrupt		1
absorb	1	
absorbed	1	
absorbing	1	
abundant		1
acceptable	1	
achievement	1	
adequately	1	
adverse		1
adversely		1
aggravate		1
aggravated		1
aggravating		1
aggravation		1
ailing		1
alarming		1
alleviated	1	
alleviating	1	

Dictionary-based and ChatGPT-based financial stability sentiment



