I. Selected research projects

CBDC AND FINANCIAL STABILITY IN DUAL-CURRENCY SAVINGS ECONOMIES

Forthcoming (estimated October 2025) on National Bank of Romania’s website

Executive Summary

- Explores financial stability risks from CBDC adoption in Romania’s dual-currency environment.
- Modelling-based built adoption hypotheses/scenarios.
- Micro and macro modelling embedded.
- Combines behaviour, trust, liquidity shocks, and ECB–NBR coordination models.
- Empirical backbone: VAR, PCA, Random Forest, LightGBM, SHAP analysis.
- 42 original financial stability indicators, 50+ visuals and dashboards.
- Replicable across all euroised/dolarised countries (e.g., Bulgaria, Moldova, etc.).
- Includes real macro trends: inflation, salary growth, and sentiment indices.
- Incorporates multi-scenario testing: recession, disinflation, financial stress.
- Models liquidity impact and costs at banking sector level.
- Visual-first: designed for policymakers, banks, and academic audiences.

1. Relevance and Problem Statement

- Dual-currency savings economies require tailored CBDC designs.
- Deposit substitution can destabilise banks without calibrated holding limits.
- Trust in banks is non-linear: when lost, deposit outflows accelerate exponentially.
- This study connects digital design to real deposit motives and shocks.
- Euroised countries face unique substitution dynamics.
- CBDC can either complement or crowd out deposits depending on design.
- Institutional trust shapes the adoption curve more than rates alone.

2. Romania as a CBDC Test Lab

- EUR and RON deposits coexist, sensitive to sentiment shifts.
- Digital euro implications is assessed jointly with Digital RON.
- Behavioural inertia, currency preference, and crisis memory are captured.
- Depositor clustering enables micro-targeted stress testing.
- Romania offers a controlled dual-currency deposit environment.
- Trust and habit play a large role in financial product adoption.
- Banks vary in exposure: Tier 2/3 more vulnerable to CBDC shifts.
- Historical banking crises influence digital safety preferences.

3. Modelling Framework

- Time-series: VAR, Local Projections, PCA decomposition.
- ML: Random Forest, LightGBM with SHAP values for feature interpretability.
- Behavioural Simulation: Agent-Based Models (ABM).
- Custom metrics: Trust-Adjusted Adoption Potential, SAF, MDR, SLBAR.
- SHAP values add explainability to machine learning predictions.
- Rolling PCA captures regime shifts over time.
- Models validated with real national-level, ECB and Eurostat data.

4. Core Results

- Optimal RON holding limit: 4,000 RON to prevent bank disintermediation.
- Optimal EUR holding limit: 800 EUR to prevent bank disintermediation.
- CBDC adoption potential: 30–40% under moderate trust.
- ECB-NBR lag > 90 days → liquidity buffer erosion > 15%.
- SHAP: Safety > interest dissatisfaction > trust erosion.
- The maximum cost for banks to cover the liquidity shortages would be approx. 1.5 bln. RON (300 mln. Euros) across the entire substitution period until the adoption upper boundaries are reached.
- Simulated stress scenarios include trust collapse and policy lag.
- Digital RON triggers more volatility than Digital EUR.
- Banks with fewer reserves breach liquidity buffers earlier.
- Visuals trace deposit outflows under adverse digital trust regimes.

5. Visual System

- CBDC Elasticity Curve, ECB Timeline, Digital Trust Spiral, SHAP Waterfalls.
- Heatmaps of Adoption Friction, Risk Sensitivity, and Financial Exposure.
- Rolling PCA for structural breaks and trust regime shifts.
- Tiered Remuneration Simulation linked to financial buffers.
- Every visual is accompanied by a clear academic interpretation.
- Bank-tier simulations embedded in waterfall and timeline visuals.

6. Policy Design Scenarios

- Tiered remuneration, shock backstops, adoption ceilings embedded in models.
- ECB-NBR dashboard framework for stress handling timelines.
- Multi-currency logic for holding limits and trust-sensitive parameters.
- Activation Lag Index predicts institutional response failure.
- Holding limits act as guardrails for liquidity stability.
- Dashboards evaluate ECB intervention timing under stress.
- Tiered remuneration scenarios compared for both EUR and RON.
- Institutional delay metrics incorporated into stress simulations.

7. Cross-Country Replication

- Annex includes ‘How to Replicate’ guide for euroised economies.
- Only CPI, salary, trust, and deposit data needed to plug into model.
- Modular: dashboards, formulas, adaptable thresholds.
- All the adoption scenarios/hypotheses can be easily replicated.
- Cross-country macroeconomic harmonisation handled by formulas.
- Flexible modules adapt to country-specific inflation and trust gaps.
- Policy dashboards can be templated with only basic inputs.

8. Who Can Use This?

- Central banks (NBR, ECB, CBs from countries with dual-currency savings economies) for design stress testing.
- Commercial banks for deposit substitution monitoring.
- BIS, IMF, and regional regulators for adoption governance.
- Researchers and modellers testing safe design scenarios.
- Think tanks exploring CBDC design can build on this template.
- Financial journalists can use visual summaries for communication.
- Academic instructors can turn slides into case studies.
- Governments assessing inclusion and digital access can leverage dashboards.

9. Concluding remarks

CBDCs are not risk-free; holding limits and trust calibration are essential.

Romania's context reveals trust spirals and shock amplification risk.

Coordination beats calibration: ECB-NBR timing more crucial than macroprudential safeguards.

With the right dashboards, CBDCs can act as safe complements—not substitutes—to deposits.

This blueprint can guide experimentation without destabilisation.

CBDCs must protect monetary sovereignty without destabilising savings.

Crisis-mode coordination is essential to prevent trust spirals.

A limit-based, non-remunerated CBDC is the safest CBDC for preserving financial stability in euroised states.

This study offers the first replicable full-stack CBDC testbed.

Demystifying Consumers' Adoption of a Digital Euro in the Euro Area

- *Dumitrescu, Catalin – Proceedings of International Conference on Business Excellence, 2025*
- This paper introduces and validates two hypotheses regarding the retail digital euro:
- i) maximum adoption is no more than 65% of the value used in ECB working papers, and
- ii) cash:deposit funding split for digital euro holdings is ~10:90.
- Combines Eurostat, Findex, and Eurobarometer survey data with macro/behavioural models.
- Uses descriptive statistics, hypothesis testing, clustering, etc.

Dealing with Real Estate Vulnerabilities: A Romanian Macroprudential Perspective

- *Neagu, Florian; Tarța, Alina; Banu, Elena; Dumitrescu, Cătălin – CBJLF, 2014*
- Assesses financial stability risks in the Romanian real estate market.
- Finds poor portfolio quality, questionable capital inflows, and heavy exposure of banks.
- Unique Romanian decade-long macroprudential experience with LTV and DSTI instruments.

Investment: What Holds Romanian Firms Back?

- *Pal, Rozalia; Wruuck, Patricia; Stamate, Amalia; Dumitrescu, Catalin – EIB WP 2019/08*
- Romania has among the lowest investment rates in the EU, despite strong growth.
- Based on EIB Investment Survey and NBR access-to-finance data.
- Identifies structural barriers and post-crisis effects in SEE investment trends.

Monetary and Fiscal Policies and Inflation Targeting

- *Dumitrescu, Catalin & Despa, Olivia – SCCEC 45, 2011*
- Game theory model of central bank, government, and private sector interactions.
- Analyses coordination scenarios using Nash solutions with inflation targeting framework.
- Explores the strategic interaction of monetary and fiscal authorities in macro outcomes.

The External Competitiveness of Romania in Global Value Chains

- *Chiriacescu, Bogdan; Bancu, Ana Maria; Dumitrescu, Catalin – Metalurgia Int., 2013*
- Explores Romania’s positioning in value-added trade versus other CEE economies.
- Uses GVC mapping to explain persistent trade deficits and low production specialisation.
- Highlights upstream positioning and import dependence vs. regional peers.

II. Selected descriptive published analyses

Contributions to Financial Stability Reports

- **Lead Author – Chapter 2.1: Financial and Economic Soundness of Romanian Enterprises**
  ✓*Authored independently on three separate occasions.*
- **Sole Author – Special Feature: Central Bank Digital Currencies**
  ✓*Provided exclusive insights into the early analysis and policy framing of CBDCs.*
- **Main Contributing Author – Chapter: Non-bank Financial Intermediaries**
  ✓*Regularly engaged as the primary analyst in drafting content and risk assessments.*
- **Contributing Author – Special Feature: Trade Credit**
  ✓*Collaborated on the evaluation of trade credit channels and systemic implications.*
- **Lead Author – Chapter 1.2: Macroeconomic Developments**
  ✓*Independently authored this section twice, offering key macro-financial narratives.*

ECB's Financial Structures Report

- **Main Contributing Author – 2016 Edition**