In-Class Assignment CB1: Retail CBDC & Deposit Flight

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Context. A mid-sized Eurozone commercial bank has a **€100B deposit base** funding a **€120B loan book** at a **2.0% net interest margin (NIM)**. The ECB is about to launch the digital euro with a **€3,000 per-person holding cap**. ECB research and the Panetta-Lagarde (2024) papers estimate 15–25% of retail sight-deposits could migrate to CBDC wallets in the first 18 months. To replace lost funding, the bank must issue covered bonds at **50 bps above its current deposit rate**.

Q1. If **20%** of deposits migrate, compute the **annual NIM impact in €**. State any assumptions.

Solution. Lost deposits = 20% × e100B = e20B. Replacement cost: €20B × 0.50% = e100M/year in additional funding cost. Baseline NIM income = 2.0% × e100B = e2.0B. **New NIM income** = e2.0**B** − e100**M** = e1.9**B, a 5% hit.** Assumptions: (i) loan book stays at €120B (not forced to shrink), (ii) only sight-deposits migrate (corporate/time deposits are sticky), (iii) covered-bond market can absorb €20B at 50 bps. If any assumption breaks (e.g. the bond market demands 100 bps), the hit doubles to €200M/year.

Q2. The **€3,000 holding cap** is the ECB's main mitigation. With 25M adult citizens in the country, what is the **maximum possible CBDC stock**? Is that enough to destabilise the bank? Is the cap binding?

Solution. Max CBDC stock = 25M × e3,000 = e75B nationwide. Even if the bank's national market share is 15%, its addressable CBDC risk is capped at ≈ e11B (roughly 11% of its deposits), not the 20% in Q1. **The cap is binding** – without it, the theoretical ceiling would be e15k × 25M = e375B, enough to destroy most bank balance sheets overnight. However, the cap is *numerical, not dynamic*: in a bank run, the ECB cannot easily raise it, and citizens would queue to convert exactly €3,000 each, making the outflow deterministic rather than panic-weighted.

Q3. Propose **one policy** the ECB should pre-commit to, to prevent a CBDC-amplified bank run. One sentence.

Solution. Waterfall unwinding: during a systemic stress event, CBDC balances exceeding an emergency sub-cap (e.g. €1,000) are automatically swept back into the citizen's commercial-bank sight-deposit at par, coupled with an unlimited ECB backstop lending facility to the bank at the deposit rate. This transforms the CBDC from a run-accelerator into a run-damper. Acceptable alternatives: (i) tiered remuneration – first €1k earns the policy rate, next €2k earns zero, above cap is negative (discourages large-balance migration); (ii) intermediated model – citizens hold CBDC only via their bank's app, so funding stays on the bank's balance sheet; (iii) cap adjusted downwards by ECB decree during a declared emergency.