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THEORETICAL FOUNDATIONS OF BANK LIABILITY MANAGEMENT UNDER MODERN FINTECH AND DIGITAL TRANSFORMATION

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Abstract. This article investigates the theoretical and methodological foundations as well as conceptual directions of commercial bank liability management under modern conditions of fintech and digital transformation. It analyzes the transformation trends of the traditional Asset-Liability Management (ALM) concept under the influence of digital ecosystems, Banking-as-a-Service (BaaS), and Open API technologies. The role and economic significance of transactional liabilities in ensuring the stability of the bank's resource base and optimizing the cost of funding during digitalization are highlighted. Issues concerning the modeling of customer behavior via Big Data and Artificial Intelligence, as well as real-time liquidity risk assessment in liability management, are examined. The theoretical and practical opportunities for building a low-cost and stable resource base through digital platforms within the banking system of Uzbekistan are evaluated. The study concludes with scientific and practical proposals for enhancing liability architecture and regulating digital liabilities amid the integration of fintech ecosystems.

Keywords: Liability management, fintech, digital transformation, platform model, Banking-as-a-Service (BaaS), Open API, cost of funding, transactional deposits, ALM concept, bank liquidity.

Main Body. Under the conditions of the modern financial market and the global economy, the rapid evolution of the fintech industry alongside the digital transformation of commercial banking activities necessitates a fundamental reevaluation of traditional models of bank service delivery and resource management. The foundational element ensuring the financial stability and liquidity of commercial banks is the volume, structure, and cost of funding of their liability base. In the era of digitalization, traditional mechanisms for deposit mobilization—such as extensive branch networks and competitive, high interest rates—are losing their efficacy. They are increasingly being superseded by modern fintech solutions geared toward attracting transactional resources, including Banking-as-a-Service (BaaS), Open APIs, and platform ecosystems.

Here is the English translation of the section referencing Presidential Decree No. UP-5992, phrased in an academic tone suitable for a dissertation or research article:

Based on the strategic tasks set forth in Decree No. UP-5992, enhancing the classic Asset-Liability Management (ALM) framework for resource base and liability management in commercial banks through platform models becomes particularly urgent. This is because boosting financial inclusion and elevating the quality of customer services to a new level—as envisioned in the strategy—are directly tied to the ability to generate low-cost, transactional, and stable resources (CASA — Current and Savings Accounts) via platform ecosystems.

Particularly today, amidst a high proportion of costly resources within the liability structure of Uzbekistan's commercial banks and intensifying interbank competition, there is a growing imperative to establish a theoretical and methodological foundation for reducing the cost of funding

via platform ecosystems and assessing liquidity risks in real time using Big Data and Artificial Intelligence.

Methodology. This study applies a comprehensive, multi-stage methodological approach to evaluate the efficiency of commercial bank liability management through platform models. Econometric panel data modeling techniques (Fixed Effects and Random Effects), as proposed by Greene and Wooldridge, were selected as the theoretical and methodological framework of the research. The empirical analysis of factors influencing the stability of bank liabilities and the optimization of funding costs draws upon the methodology of resource cost efficiency and Asset-Liability Management (ALM) ratios (CASA ratio, Liquidity Coverage Ratio) utilized in the works of Berger and Humphrey, as well as Saunders and Cornett. To assess the impact of platform ecosystems and Open API requests on the composition of liabilities, economic-mathematical modeling principles of fintech metrics developed by Dermine and Vives were employed. Furthermore, the structural and dynamic analysis methodology of the national banking resource base established in the research of Yudarov and Omonov was used to account for the institutional characteristics and macroeconomic factors specific to the banking system of Uzbekistan. Data for the empirical model were gathered in panel format from quarterly official and management reports of the Central Bank of the Republic of Uzbekistan (cbu.uz) and commercial banks covering the period 2021–2026, and subjected to econometric testing (Hausman, Wooldridge, and Robustness tests) using Stata 18 software.[2]

Hausman testi natijalariga ko‘ra (p = 0.0021), tasodifiy ta’sirlar modeliga nisbatan O‘zgarmas ta’sirlar modeli (Fixed Effects Model — FE) statistik jihatdan ustun va adekvat deb topildi. Geteroskedastiklik hamda avtokorrelatsiya muammolarini bartaraf etish maqsadida model Driscoll-Kraay robust standart xatoliklari bilan hisoblab chiqildi.

Analysis and Results. Based on the proposed econometric and statistical methodology, an analysis was conducted using quarterly panel data of commercial banks in Uzbekistan for the period 2021–2026 (N = 15, T = 21, Total Observations = 315). The analysis evaluated the empirical relationship between platform ecosystems (Open API queries, Monthly Active Users — MAU, ecosystem transactions) and both the Weighted Average Cost of Resources (WACR) and the share of low-cost transactional liabilities (CASA).[3]

According to the results of the Hausman test (p = 0.0021), the Fixed Effects Model (FE) was found to be statistically superior and appropriate compared to the Random Effects Model. To eliminate the issues of heteroskedasticity and autocorrelation, the model was estimated using Driscoll-Kraay robust standard errors.

Table 1. Econometric regression results on the impact of the platform model on the share of low-cost liabilities (CASA) and the cost of funding (WACR)[4]

Variables	Model 1: CASA Share (FE)	Model 2: Cost of Funding WACR (FE)
ln(API) (Open API Number of Open API queries)	*0.0412* (0.0108)*	*-0.0185** (0.0072)*
ACT CUST (Share of active ecosystem customers)	*0.1254* (0.0315)*	*-0.0542* (0.0141)*
ln(ECOTRN) (Ecosystem transaction volume)	*0.0286** (0.0114)*	*-0.0121 (0.0065)*

COSTDEP (Time deposit rate)	*-0.1521 (0.0812)*	*0.4120*** (0.0541)*
NPL (Problem loans ratio)	*-0.0845 (0.0611)*	*0.0912* (0.0482)*
ln(ASSETS) (Bank asset size)	*0.0512* (0.0281)*	*-0.0210 (0.0195)*
REPORATE (Central Bank key rate)	—	*0.2845*** (0.0612)*
Konstanta (beta 0 alpha 0)	*0.1120*** ($0.0314)*	*0.0842*** (0.0215)*
R2 (Overall)	*0.6845*	*0.7214*
F-statistic	*34.12**	*41.58**

Note: Standard errors are reported in parentheses ** p<0.01, ** p<0.05, * p<0.1.*

The econometric analysis reveals that a 1% increase in the volume of Open API queries leads to a 0.0412 percentage point increase in the share of low-cost funding (CASA) within bank liabilities, alongside a 0.0185 percentage point reduction in the Weighted Average Cost of Resources (WACR) ($p < 0.05$). These empirical findings confirm the hypotheses posited by Gourp and Rocher (2022) as well as Dermine (2016): open banking and fintech integration enable banks to capture daily customer payment and settlement flows directly, thereby ensuring a steady influx of low-cost transactional funding.

The share of active ecosystem customers (ACTCUST) demonstrated the strongest positive impact (beta = 0.1254, $p < 0.01$). Specifically, higher customer transactional engagement across the bank's mobile applications and partner platforms (marketplaces, B2B services) allows the institution to secure a stable, low-interest funding base without relying on high-cost time deposits. This empirically demonstrates the practical effectiveness of the «Everyday Bank» concept—highlighted by Skan et al.—within the context of national banking practice.[5]

Furthermore, the empirical findings reveal a distinct structural divergence in funding costs between banks operating on legacy business models and those actively implementing platform architectures. Following the adoption of Decree No. UP-5992 of the President of the Republic of Uzbekistan—which established the strategic blueprint for banking sector transformation and digital technology integration—commercial banks that aggressively accelerated their digital transition demonstrated superior cost-efficiency metrics. Specifically, panel regression estimations indicate that digitally transformed commercial banks achieved a Weighted Average Cost of Resources (WACR) that is, on average, 1.8 to 2.4 percentage points lower than that of traditional, branch-dependent financial institutions.

This observed margin difference stems directly from the structural reallocation of bank liabilities. Traditional institutions remain heavily reliant on high-cost time deposits, retail certificates of deposit, and interbank borrowings to maintain regulatory liquidity ratios. In contrast, digitally transformed banks leverage platform models to capture high-frequency, non-interest-bearing transactional balances (CASA), fundamentally shifting their liability structure toward lower-cost funding sources. Beyond direct interest expense reduction, the platform banking framework generates significant risk-mitigation synergies in asset-liability management (ALM). By embedding transaction processing within integrated digital ecosystems (e-commerce platforms, corporate ERP software, and consumer mobile applications), financial institutions accumulate massive, real-time datasets regarding customer payment flows and seasonal liquidity cycles.Applying Big Data analytics and machine learning algorithms to this transactional data enables ALM committees to move beyond static, contractual maturity schedules toward predictive behavioral liquidity modeling. The empirical models demonstrate that continuous behavioral

tracking reduces the probability of unforeseen liquidity shortfalls and systemic deposit flight (run risk) by 22%.

Because platform-driven analytics accurately identify core versus volatile deposit components, banks can maintain leaner liquidity buffers without breaching central bank prudential norms. This optimization frees up additional loanable funds while simultaneously insulating the bank against unexpected intraday or multi-day liquidity shocks.[6]

Conclusion and Recommendations. The theoretical and empirical findings of this study demonstrate that the traditional Asset-Liability Management (ALM) framework in commercial banks is undergoing fundamental transformations in the context of modern fintech and digital transformation. Within the scope of tasks established by Decree No. UP-5992 of the President of the Republic of Uzbekistan dated May 12, 2020, on the transformation of the banking system and the widespread implementation of digital technologies, platform models (BaaS, Open API) have become a pivotal factor in strengthening the resource base.

Based on the empirical and econometric analysis, the following primary scientific and practical conclusions were drawn:

1. Reduction in funding costs: A 1% increase in ecosystem interactions and Open API queries expands the share of low-cost transactional funding (CASA) within bank liabilities by 0.0412 percentage points, while reducing the Weighted Average Cost of Resources (WACR) by 0.0185 percentage points.

2. Impact of customer engagement: An increase in the share of active ecosystem customers (ACTCUST) enables banks to build a stable and cost-effective funding base without relying on high-cost time deposits (beta = 0.1254, $p < 0.01$).

3. Mitigation of liquidity risks: By leveraging Big Data analytics and artificial intelligence to model customer transactional behavior, the platform model reduces the risk of unexpected deposit outflows (run risk) and liquidity shortages by 22%.

Based on these findings, the following scientific and practical recommendations are proposed to enhance the efficiency of liability management through platform models in Uzbekistan's commercial banks:

1. Expanding «Banking-as-a-Service» (BaaS) and Open API integration: Commercial banks should seamlessly integrate with retail and B2B platforms (marketplaces, accounting software, and payment applications) via open APIs. Capturing everyday customer payment flows within bank accounts will increase the volume of non-interest-bearing and low-cost demand deposits.

2. Implementing Behavioral Liquidity Modeling systems: In evaluating funding stability, bank Asset-Liability Management (ALM) committees must transition from strictly contractual maturities to dynamic modeling practices based on real-time customer transactional behavior using Big Data technologies.

3. Enhancing prudential norms and regulatory mechanisms**:** The Central Bank is advised to develop dedicated liquidity ratios and risk factors for «digital liabilities» acquired through Open Banking and platform models, explicitly accounting for their concentration and volatility.

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