

DIGITAL BANKING TRANSFORMATION IN TÜRKİYE

Business Models, Competition and Financial
Stability over the Next Decade

2026–2036

Three structural scenarios

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Executive summary

The decisive consequence of digital transformation in Turkish banking will be the redistribution of the customer relationship, distribution, data access and risk bearing across institutions. Moving transactions to a mobile screen is only one component. Bank boards need to establish which customer decisions they influence, how the resulting relationship is funded, and whether the service chain can withstand disruption. With an information cutoff of 30 September 2026, this report examines 2026–2036 through three dominant structures: the bank as a platform, the bank as invisible infrastructure, and programmable money and financial transactions. These are conditional structural scenarios, without assigned probabilities.

Digital access does not measure the primary banking relationship. Active digital banking records in the TBB reporting population reached 129.335 million in June 2026, up 6.92% annually but down 0.10% from the previous quarter. One login during the preceding three months qualifies as activity. The indicator does not establish revenue depth or deposit loyalty. Records are not deduplicated across banks, and participation banks are excluded, so dividing the total by the population does not yield penetration. Banks should add permissioned customer-level measures of salary/collections, the main payment account, balance persistence and net relationship value to acquisition volume. [S08; F1]

Controlling the interface does not mean bearing credit risk. Türkiye's service banking rules preserve the bank's credit allocation decision and the contract between bank and customer. A platform can gain bargaining power through access and ranking, while losses, capital and liquidity responsibilities remain elsewhere. Partnerships should therefore be judged by contribution after risk, data access rights, renegotiation terms and the ability to move to another partner, before customer volume. [S14; F3]

Efficiency must be assessed alongside funding and distribution costs. Lower transaction costs can coexist with more rate-sensitive deposits and a larger revenue share for interfaces. Updated US research supports this mechanism but does not estimate the Turkish effect. In this report's entirely illustrative balance-sheet exercise, 45 basis points of gross operating savings fall to 19.5 basis points after customer pass-through and technology/governance costs. With deposits equal to 60% of assets, a 10 percentage point interest-rate shock and a 10 percentage point increase in deposit beta, incremental funding cost is 60 basis points. The impact on pre-tax return on total assets becomes –40.5 basis points. This is a demonstration of a frequently omitted cost channel, not a forecast. [S31; F2; H01]

Financial concentration and technology dependence require separate maps. Competing banks may rely on the same cloud, identity, data or AI infrastructure. Even dispersed balance sheets can face a common disruption. Counting named suppliers is insufficient: subcontractors, regions, communications and model versions must also be mapped. No verified Turkish supplier shares were available, so this report does not calculate a national technology concentration ratio. [S28–S29; F4]

Inclusion must be assessed beyond access. Internet use among ages 16–74 reached 92.3% in TÜİK's 2026 survey. This does not measure safe financial use or appropriate access to credit. Transaction data can help thin-file SMEs but can also exclude customers with weak data trails. Human appeals, accessible design, assisted services and disaster/disruption continuity belong in the competitive strategy. [S13; S32; S44; F6]

Programmable settlement can relocate risk rather than eliminate it. Delivery versus payment and permissioned data can make SME receivables and collateral usable sooner. Losing netting, intraday credit or liquidity reuse can nevertheless increase prefunding requirements. The ECB's Pontes launch on 21 September 2026 is a concrete wholesale infrastructure development. Digital Turkish Lira work remains research and development. A pilot, issuance and commercial scale must not be treated as equivalent. [S21–S22; S40; F5]

Together, these findings support a vision that manages the primary relationship and balance-sheet resilience jointly. The desired Turkish system is interoperable, preserves customer authority, makes risk and responsibility visible, and finances productive investment. Relationship measurement, deposit stress analysis, supplier mapping, AI controls and portable contracts are near-term priorities. Tokenisation and customer-authorised AI agents should expand in stages as legal certainty, customer benefits and scalable liquidity arrangements become demonstrable.

1 Research question and scope

Digital transformation matters strategically because it can change where banking's essential functions are combined. Customer access need not remain with the institution carrying capital and risk. In Türkiye, the scope of that separation needs to be assessed within the existing licensing framework and funding conditions. [S14; S26–S27]

Decision question and boundaries

Main question: Under what conditions will digital transformation change the customer relationship, control over data, distribution of financial services, the institutions carrying the balance sheet and risk, and the sharing of economic value in Turkish banking over the next decade?

The intended readers are bank boards, strategy and investment teams, regulators, fintechs and corporate decision-makers. Supported decisions include technology and distribution budgets, partnership contracts, funding strategy, risk appetite, product governance and supervisory monitoring. The report does not produce a bank or security valuation, an institution-specific capital requirement, or a final legal opinion on licensing.

The information cutoff is 30 September 2026. The ten-year horizon runs from that date to 30 September 2036, abbreviated as 2026–2036. The roadmap uses approximately 2026–2028 for the first two years, 2028–2031 for years 3–5, and 2031–2036 for years 6–10; boundary years represent transitions. Preparation dates, source publication dates and observation periods are separate fields. Preparation does not establish when the report is uploaded to the website.

Deposit and participation banks are considered according to their funding contracts. Development and investment banks are included through long-term finance, market funding, advisory and capital-market functions. A digital bank is an operating model within the relevant deposit/participation bank framework, rather than a separate legal banking function. An incumbent bank's digital brand does not automatically constitute a new digital-bank licence. [S14]

Initial hypotheses and research outcome

Eight candidate propositions were recorded during initial scoping. The evidence qualified all of them. Strong claims that digital growth improves every bank's profitability, that automation alone causes deposit flight, or that tokenisation always saves liquidity were rejected. Eight findings, F1–F8, were retained, separating confidence in the mechanism from the ability to measure its Turkish magnitude. This was evidence adjudication, not experimental preregistration or a statistical hypothesis test.

2 Starting conditions for transformation in Türkiye

Macroeconomic starting conditions

Annual CPI inflation was 31.51% in August 2026, while the one-week TCMB repo rate was 37% following the 10 September decision. These are observations relevant to repricing, technology budgets and customer choices. Subtracting them does not calculate a bank's real funding cost: expectations, taxes, maturities and customer rates differ. [S11–S12]

Disinflation and stable growth can improve real cost measurement, create longer usable SME cash-flow histories and help amortise relationship investment. Persistent inflation and exchange-rate volatility can tie switching to rate/currency searches, increase foreign-currency technology expenses and disrupt collateral values and historical credit-model relationships. In a slowdown, collections data provide information but do not create repayment capacity. Young customers' mobile experience and older/disabled customers' accessible and assisted services matter simultaneously. One undifferentiated digital-customer strategy hides this distribution.

Scale of access and depth of relationship

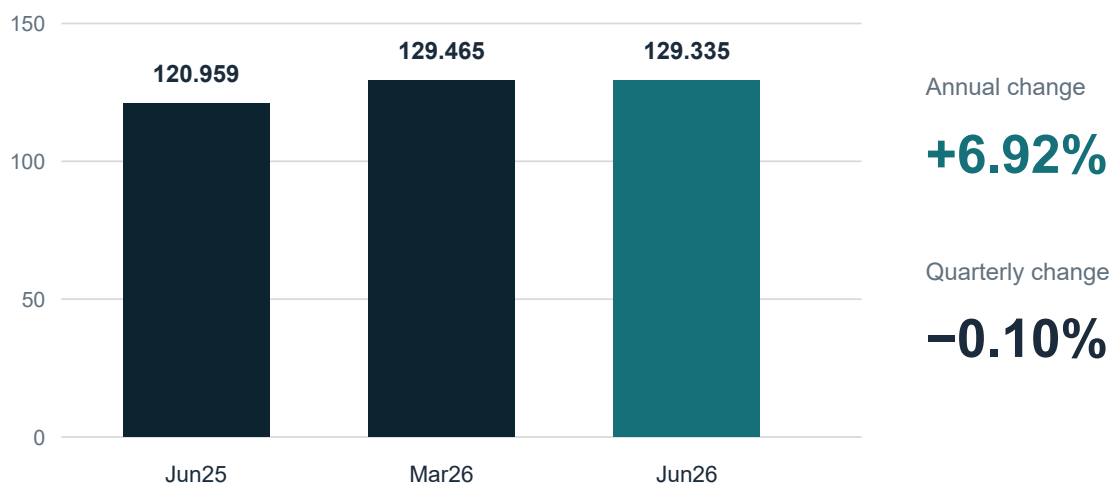
Mobile channels have substantial scale; a digital record does not prove control of the economic relationship. The June TBB total and quarterly activity are in Table 1. Relationship depth and service quality become important alongside acquisition. Coverage, duplicate customers and a login-based definition cannot identify unique users or loyalty effects. Campaigns should be assessed by established cash-flow relationships and contribution after risk.

Table 1 Starting indicators with definitions preserved

Indicator and class	Value / unit	Period / coverage
Active digital records [G; S08]	129.335 million records	Jun 2026; TBB, no cross-bank deduplication; participation excluded
Annual / quarterly change [H; S08]	+6.92% / –0.10%	Compared with Jun 2025 / Mar 2026
Active / registered mobile [G; S08]	128.378 / 228.636 million records	Jun 2026; last3 months / historical registration
Mobile financial transactions [G; S08]	2,728 million; annual +7.06% [H]	2026Q2; 2025Q2: 2,548 million
Mobile transaction value [G; S08]	TRY57,033bn; nominal annual +34.09% [H]	2026Q2; 2025Q2: TRY42,532bn; not real growth
Annual CPI inflation [G; S11]	31.51%	Aug 2026; national2025=100 index
One-week repo [G; S12]	37%	10Sep2026 decision; not a customer rate
Internet use [G; S13]	92.3%; women89.9% / men94.8%	2026; ages 16–74; gap4.9 percentage points [H]

Sources: S08 printed i/iii/iv; S11 bulletin58290; S12 DUY2026-38; S13 bulletin58006. Published: TBB Aug 2026(exact day unconfirmed); CPI3Sep, policy10Sep, ICT5Aug. Access 30Sep2026. H03 converts thousands/millions and changes; nominal flows are not deflated. G: observed value; H: calculated change.

Figure 1 Growth in active digital records does not measure primary ties



Unit: million non-deduplicated bank records. Jun 2025/Mar 2026/Jun 2026. S08 printed i; H03 changes. Participation excluded; last3 months login; 35/31 coverage discrepancy unresolved. Zero-based axis.

Figure 1's annual growth and small quarterly decline use different comparisons. Together, they show why a change in durable relationships cannot be inferred from aggregated records. This report proposes a “primary bank” measurement concept: the institution through which a person or business mainly manages recurring cash inflows, essential payments and day-to-day financial decisions. It is not the name of an existing official TBB series.

The August 2026 onboarding table available at the cutoff reports 1,230,110 remote individual applications and 685,436 completions through representatives. Their ratio is not a conversion probability. For acquisition cost, the appropriate denominator is a validated usable customer from the same cohort. For economic value, a stronger denominator is a customer directing the main cash flow through the institution after 90 and 180 days. Repeat applications, existing-customer channel registration and inactive openings should be separated. [S09; S47]

Infrastructure and regulatory boundary

FAST is an instant, continuous transfer infrastructure, not a new type of money. The 49 participants at year-end 2025 in the TCMB annual report show banks and non-banks accessing a common payment infrastructure. KOLAS provides addressing, Request to Pay supports initiation, and SİPER provides a risk-sharing layer. These can reduce transaction friction, while fraud controls, disputes and final settlement responsibility still require design. The 2025 count is not used as a current 2026 participant total. [S19]

The March 2026 announcement of ÖHVPS 2.0.0 broadens use cases through card information and advanced-dated/recurring initiation. It does not demonstrate a general open-finance regime, portability of all investment/insurance data, or unlimited transaction authority for AI agents. Technical access, valid customer authority, licensing and responsibility are separate. User and daily transaction-volume figures in the release are not compared with TBB penetration because deduplication and transaction definitions are not harmonised. [S20]

In service banking, the bank supplies licensed functions and the interface provides customer access. The regulation retains credit decisions at the service bank, requires a bank–customer contract, and provides specific joint responsibilities for authentication and transaction security. This is not automatic joint liability for all credit losses. Digital-bank restrictions on customer scope and physical organisation must be read with

approval/exception arrangements. Future relaxation is a scenario assumption, not the basis for a current strategy. [S14]

Payment and electronic money institutions operate within the TCMB's Law 6493 permission framework. Funds collected for e-money are not treated as deposits or participation funds; safeguarding and redemption arrangements are distinct. The report does not assume these institutions originate balance-sheet credit on the same basis as banks. Bank funding, platform access and payment institutions' transaction/data capabilities are different economic functions. [S16]

Table 2 Inventory of rules pilots commercial use and plans

Topic	Verified status	Inference to avoid
Digital/service banking [S14]	In-force framework; original Gazette and current catalogue	Future amendments not all verified; product-specific law separate
Payments/e-money [S16]	Consolidated TCMB regulation; commercial services	Not a deposit or unrestricted lending licence
ÖHVPS 2.0.0 [S20]	17Mar2026 functions release; operating infrastructure	Not general open finance/unlimited agent authority
Digital TL/ecosystem [S21–S22]	R&D, pilots and selected development projects	23projects do not establish general issuance/commercial volume
Turkish open finance / AI agents	Conditional analytical future; no comprehensive official draft verified in this study	No invented draft or in-force regime
Visa agent tools [S43]	Corporate developer/product announcement	No Turkish licence, broad use or independent benefit proof
Pontes [S40]	21Sep2026 launch; staged onboarding; 2028 enhancement expectation K	Launch is not volume evidence; full future rollout unrealised
Agorá / DORA [S42; S41]	Agorá prototype; DORA applies in EU from 17Jan2025	Prototype is not a commercial network; no blanket Turkish applicability

Unit: implementation/legal status; cutoff 30Sep2026. Cited primary releases/rules. Unverified drafts indicate the study boundary, not proof of absence. Commercialisation requires separate evidence. K: institutional forecast or announced plan.

3 The value chain and financial stability

Access, data processing, pricing and risk bearing can be integrated or separated. Service banking supplies a legal framework for separation; research identifies funding, distribution and supplier channels. Losing front-end visibility does not mean a bank disappears; its share of profits and its responsibility change. Turkish revenue-sharing contracts and platform-originated cohort performance are not public. Strategy should map control rights, customer value and loss bearing together. [S14; S26–S31]

Figure 2 Separated control changes the location of risk

	Customer	Data access	Distribution	Balance sheet	Risk
A	Bank	Bank	Bank	Bank	Bank
B	Interface	Authorised parties	Interface	Bank	Bank + chain
C	Bank/interface	Permissioned network	Bank/interface	Issuer	Issuer + network

Unit: qualitative function map. Horizon 2026–2036; A/V. S14 and Axis analysis. Data access is bounded by customer rights and law; colours are not market shares.

Competition requires three lenses. At product level, lower search and switching costs can increase price pressure. At distribution level, a platform's access or ranking advantage may force banks into price competition and capture commission. At infrastructure level, data, identity, cloud and model providers can gain scale advantages. More banks do not automatically reduce concentration in the latter two layers. Counterweights include multiple partners, portability, open standards, appeals and relationship quality.

Customer relationships and distribution power

The economic value of digital growth depends less on application logins than on where customers organise their everyday financial decisions. TBB's non-deduplicated, login-based records describe channel activity; they do not identify persistent deposits, the primary payment relationship or total customer value. Frequently used mobile services may deepen salary, payment and investment relationships at some banks. Customers may also save at one bank while selecting products through another interface. This distinction shapes revenue sharing when distribution moves to platforms. [S08; F1]

Türkiye's service-banking framework retains credit decisions at the bank while a platform can direct applications and rankings. Funding, trust and licensing give banks bargaining strength, but commissions may rise when products are interchangeable and access concentrates in a narrow interface. Passing service savings to customers also depends on genuine choice, portability and transparent ranking. Public evidence does not quantify Turkish partnership revenues or cohort risk performance. Management should therefore assess acquisition alongside primary cash flows, average balances and contribution after risk, securing data access and service continuity after termination in contracts. [S14; S26–S27; S34–S40; F3; F8]

Digital services and the economics of AI

Mobile banking and remote onboarding can reduce travel and distribution costs. Incentives, fraud, identity verification and inactive-account maintenance reduce the net gain. Continuous payments can reduce uncertainty in business collections but also require continuous liquidity and incident management. Open banking helps comparison and cash-flow analysis while adding consent renewal, API reliability, classification and minimisation costs. Embedded finance can offer an appropriate product in context; commission-driven ranking can encourage unsuitable recommendations.

AI can extract information for credit assessment, but poor targets, selected approved-customer samples and regime breaks create risk. Fraud detection benefits from network and behavioural signals, while false-positive blocking creates customer costs. Document processing, software and controls can become faster, yet savings require deductions for rework and quality failures. Customer service must distinguish response speed from resolution; incorrect information and privacy breaches matter. Elasticity-based pricing can improve margins but can also exploit information asymmetry. Every use needs a stated purpose, data provenance, accountable owner, limits, human intervention and a stopping mechanism. [S27; S29; S32]

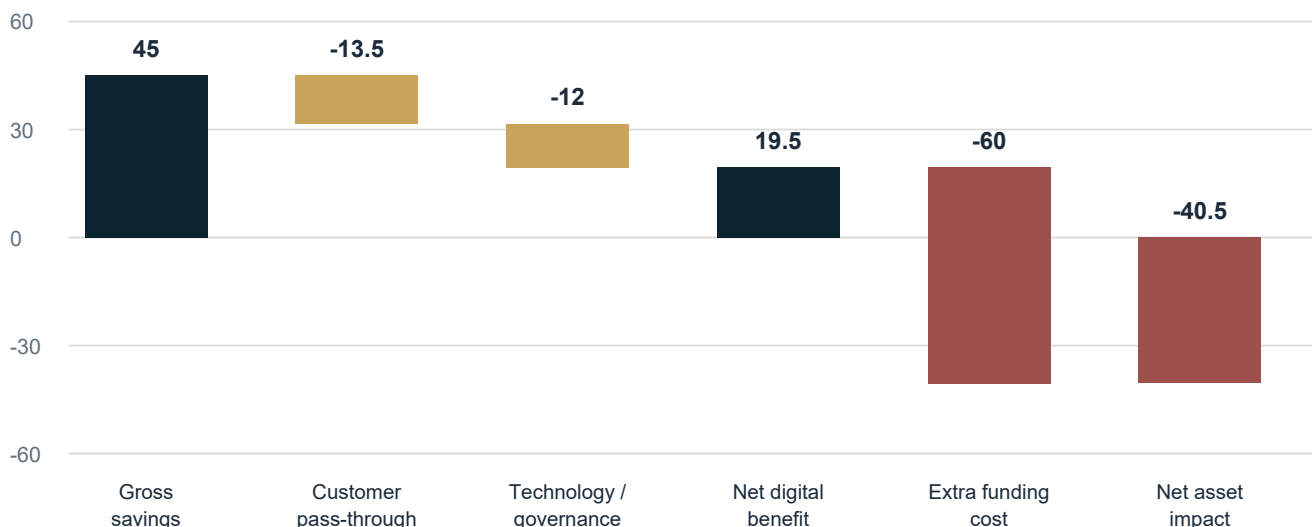
A customer-authorised AI agent could compare offers continuously and manage deposit, credit and payment choices. Here an agent is software working within the customer's objectives and limits; it does not automatically have a bank licence or payment authority. Net return comparisons should include tax, fees, protection, maturity and liquidity. Authority must be revocable and transactions traceable. Paid agents require disclosure of conflicts, ranking criteria and remedies. Corporate agent-payment tools support technical feasibility, not widespread autonomous bank selection in Türkiye. [S43]

The full economics of digital investment

Lower transaction costs alone do not determine the return a bank retains from digital investment. Easier comparisons and transfers can accelerate repricing of rate-sensitive deposits. Research on US banks supports this channel but does not establish an equivalent coefficient for Türkiye. Trust, salary and collection relationships, and service quality can limit switching. Savings therefore need to be assessed alongside customer pass-through, distribution payments, technology governance and funding costs. [S31; F2]

The report's hypothetical bridge starts with 45 basis points of gross savings. Customer pass-through and additional technology costs leave 19.5 basis points for the bank. The selected deposit ratio, rate shock and additional beta assumptions produce 60 basis points of funding cost, taking the pretax effect measured against total assets to –40.5 basis points. This is not a forecast. Türkiye's inflation and interest-rate regime also changes currency-sensitive technology costs and credit losses. Automation can remain beneficial during volatility, but a budget built on one nominal path conceals its fragility. Decisions require product- and customer-specific funding and cost stresses calibrated with internal data. [S11–S12; S23; F7; H01]

Figure 3 Operating savings assessed with funding costs



Unit: basis points of total assets, pre-tax, other effects fixed. Undated H01/V. Axis assumptions/reproduce.py. Gross 45–customer 13.5–technology 12=19.5; funding 60→net–40.5. Not a Turkish forecast.

Deposit movements and financial stability

Digital channels can accelerate gradual yield-seeking, which differs from a collective run following loss of confidence. FSB's assessment separates easier transfers from balance-sheet, liquidity and depositor vulnerabilities. Stress analysis should include duration, hedges, asset sales, collateral access and customer groups. Slowing the application does not repair the underlying lack of confidence. [S30]

Instant service also creates a welfare trade-off: stopping a suspicious transaction can prevent fraud but block an urgent payment. Risk-based verification, clear warnings, dependable support and prompt loss assessment are required. Customer-authorized agents reacting simultaneously to similar rankings could correlate routine repricing flows. This has not been observed at such scale in Türkiye and remains an analytical scenario channel for monitoring and limited pilots, not a reported national event.

Technology dependence and inclusive services

More banks or a wider range of digital services do not establish that infrastructure risk is dispersed. Competitors relying on the same identity service, network, cloud or foundation model can suffer a common disruption; shared model updates can generate similar errors. BCBS and FSB identify these dependencies. Specialist providers can offer strong security and continuity. What matters is whether a critical function can continue in an independent failure domain, rather than how many suppliers appear on a list. Türkiye's provider network has not been verified, so sector-wide concentration cannot be calculated. [S28–S29; F4]

Data advantages can also distribute customer benefits unevenly. Permissioned payment and collection data may reveal a thin-file SME's repayment capacity, while weak data trails or inadequate devices may become new barriers. Research and survey coverage limits warrant investigation; rejection differences alone do not prove discrimination. Banks should map subcontractors and model versions, test independent continuity, and incorporate human appeals, assisted access and comparable-risk outcome reviews into costs. Efficiency then includes service disruption and incorrect exclusion. [S13; S32; S44; F6]

Programmable transactions and liquidity

Programmable finance matters to banks because it can jointly redesign payments, assets and collateral movements, beyond introducing a new record format. Conditional, simultaneous transfers may reduce counterparty exposure and collection delays, shortening a firm's cash cycle and easing financing needs. BIS research and Pontes connect this mechanism to bank and central bank money; Türkiye's initiatives remain in development and testing. A technical pilot does not establish commercial scale or a complete legal regime. [S21–S22; S33; S40; S42; F5]

The same acceleration can tighten banks' intraday liquidity. Moving from netted transactions to fully prefunded gross settlement requires more resources without credit or liquidity reuse. Preserving netting, collateral mobilisation and queue management may reverse the outcome. Cash-cycle improvements can also arise from ordinary instant payments or better invoice workflows, so pilots need comparison with a well-designed conventional process. Investment decisions should measure total process costs, peak liquidity, collateral lock-up, failed-transaction recovery and customers' working-capital costs alongside speed. Without demonstrated net benefits, architecture or scale should be reconsidered. [F5; H02]

Legal and economic distinctions between digital money instruments

Table 3 Claims risks and implementation status of digital instruments

Instrument / legal claim	Issuer and main risk	Function / status30Sep2026
Book deposits / participation funds	Relevant bank; credit, liquidity, contract risk	Commercial payment/funding; protection depends on eligibility
Tokenised deposits	Bank claim if legally constituted; code/custody/finality risk	Design-dependent; no assumed general Turkish commercial regime
Digital Turkish Lira / CBDC	Designed as central bank liability; privacy/operations	TCMB research/testing; no evidence of general issuance [S21–S22]
Electronic money	Authorised issuer; safeguarding/redemption/operations	Commercial payment value, not deposits; no interest/holding benefits [S16]
Stablecoins	Private issuer/reserves by design; redemption/currency/run risk	Foreign designs; Turkish payment-definition boundary applies [S17; S33]
Unbacked cryptoassets	Usually no bank/central bank claim; price/custody/network risk	Turkish payment-use prohibition; other activities have separate law [S17]
FAST / APIs / smart contracts	Not money issuers; rail/connection/code services	Infrastructure or execution logic; does not redefine the underlying claim

Unit: legal/functional classification. S14; S16–S17; S19; S21–S22; S33. Protection and token eligibility require product-specific legal assessment. A CBDC pilot is not an issuance decision for all designs.

“Programmable” in Table 3 means conditional execution, not that every use of money is restricted by the issuer. TCMB's phase-two progress report and August 2026 ecosystem announcement concern development and testing. Collaboration with banks is not evidence of general Digital Turkish Lira issuance or a complete legal regime for every tokenised deposit. Agorá is also evidence from wholesale cross-border prototyping. Technology status, legal permission and commercial scale are recorded separately. [S21–S22; S42]

A properly constituted tokenised deposit represents a claim on a bank. Code or ledger changes alone do not determine deposit status, insurance eligibility or insolvency priority. Central bank money is a central bank liability; e-money has separate safeguarding/redemption arrangements; and a stablecoin has private issuer/reserve risks depending on its structure. Türkiye's crypto-payment prohibition applies within the

regulation's definition. Every record called a token cannot automatically be put in the same category; a new design requires specific legal verification. [S16–S17; S33]

Table 4 The design trade-off between speed and liquidity

Illustrative process	Starting point	Alternative / outcome
Gross daily settlement volume	100 units	100 units; unchanged volume
80% netting; no credit/reuse	20 net settlement units	Fully prefunded gross atomic: 100 units; 5 times
Separate collections example: 100/day	2-day delay; 200receivable units	0.25 days; 25 units; 175released
Risk direction	Delay/counterparty exposure	May fall; liquidity/code/operations remain

Unit: hypothetical monetary units and days. Undated structural example; H02/V. Axis formulas; mechanisms S33/S40/S42. Not Turkish volumes or observed pilot results. The 5 times result does not hold if netting/credit is retained.

What international experience means for Türkiye

Brazil is selected as a bank-centred emerging economy combining public instant payments and open finance. India illustrates separate interfaces and permissioned data at scale. The UK provides evidence on open-banking definitions, commercial governance and AI supplier dependence. The euro area provides a concrete move toward tokenised wholesale settlement in central bank money. These are purposive examples of critical mechanisms, not a ranking selected to showcase success.

Table 5 Purposive comparisons and transfer limits

Example / rationale	Transferable mechanism	Enablers / limits
Brazil: emerging economy; payments+open finance [S35]	Competition on shared rails; accounts versus people	FAST/ÖHVPS similar functions; macro/income/law differ
India: interface and permission layers [S36–S37]	Separate account, app and data access	Turkish API/service banking; scale/pricing/licences differ
UK: standards/governance and AI [S38–S39]	Connections versus people; shared-supplier monitoring	Similar measurement issues; sample/law differ
Euro area: wholesale token settlement [S40–S41]	Finality, liquidity access and critical ICT oversight	TCMB R&D; monetary/legal/collateral architecture differs

Unit: qualitative mechanisms. Sources 2017–2026; cutoff 30Sep2026. S35–S41 and Axis selection/transfer analysis. Not a performance or harmonised penetration ranking.

Brazil's end-2024 open-finance figures distinguish 62 million authorised accounts from 41 million unique clients. Even within one system, accounts and people differ. This is not an adoption rate transferable to Türkiye. Pix and open finance show how shared payment access can support competition, without removing the need for ranking governance, data quality and consumer protection. FAST and ÖHVPS make the mechanism relevant; income, inflation, data regulation and funding differences limit outcome transfer. [S35]

India's multi-bank UPI architecture illustrates using a bank account through a third-party application; RBI's Account Aggregator framework provides a separate permissioned-data layer. Payment interfaces, aggregation and balance-sheet credit are distinct functions. The transferable lesson is the separation of data and distribution through interoperable standards. Historical UPI pricing, population scale and interface market shares are not

automatically transferable. The 2017 NPCI circular is evidence of architecture, not an exhaustive 2026 rulebook. [S36–S37]

UK open banking recorded 16.5 million brand connections in December 2025. OBL's figures cover 20 reporting CMA9 brands and do not deduplicate people across brands. In the 2024 BoE/FCA survey, 75% of 118 responding financial firms reported AI use. The top three providers accounted for 73% of reported cloud-provider relationships, not spending or bank balance sheets. These facts support separate measurement of users and common dependencies, rather than an estimate of Turkish concentration. [S38–S39]

Pontes launched on 21 September 2026 as a solution for wholesale DLT transactions to settle in central bank money, with staged participation and enhancements. Its later full-implementation schedule is an institutional plan. It is not retail digital euro issuance or an equivalent Turkish legal architecture. The transferable issues are finality between ledgers and access to liquidity. Euro-area securities, central bank credit and regulatory arrangements differ. DORA provides a critical-provider oversight example, without blanket direct application to all Turkish banks. [S40–S41]

These mechanisms make the distribution of control and responsibility more informative than a single technology timetable. Whether customer decisions remain at the bank or move to an independent interface distinguishes A from B; settlement architecture becoming economically dominant defines C. The three scenarios turn these differences into coherent paths under Türkiye's common macroeconomic and operational stresses.

4 Three structural scenarios

Selection and decisive uncertainties

For A and B the key uncertainty is who directs customer decisions; for C it is the architecture of money and settlement. Mobile scale/service banking make the first distinction relevant; TCMB pilots and Pontes make the second relevant. The initial candidates are retained, but C is not interpreted as new money replacing banks. Law, trust and net benefits may constrain transition. Build common capabilities and conditional options before irreversible commitments to one future. [S08; S14; S21–S22; S40]

Table 6 Drivers distinguishing the scenarios

Driver	Impact / uncertainty	Decisive observation
Control of primary decisions	High / high	Bank-led or independent interface?
Permissioned data/portability	High / high	Sustainable and revocable authority?
Distribution/ranking power	High / high	Where does contribution after risk accumulate?
Legal balance-sheet/credit control	High / medium	Are licensing/contracts changing?
Money/settlement finality	High / high	Actual volume, redemption and collateral rules?
Critical technology dependence	High / medium-high	Independent continuity tested?
Macro regime/funding	High / high	Joint beta, outflows, currency costs and losses?
Inclusive access and trust	Medium-high / high	Safe use and appeals across groups?

Unit: qualitative judgment, not scores/weights. Horizon 2026–2036. F1–F8 and S14/S21–S22/S26–S33/S40; Axis selection. Impact concerns decisions/system functions, not probability.

Impact and uncertainty classifications are researcher judgment, not estimated scores or weights. A and B are different dominant ends of one control axis. C is an infrastructure change cutting across that axis and becoming economically dominant. The scenarios are therefore not an exhaustive mathematical partition of mutually exclusive states. A bank may have A in consumer services, B in SME distribution and C in securities settlement. The scenario identifies which structure primarily determines its economics and risk management.

Fully disintermediated decentralised credit, a single public financial platform, prolonged digital stagnation, or forced restructuring under a severe macro crisis may fall outside the set. The last two are initially common stresses; if persistent, the scenario set should be redesigned. New regulated intermediaries outside banking also require perimeter monitoring. Probabilities are not assigned because the evidence does not support calibration.

A The bank as a platform

Starting conditions and critical assumptions: Incumbents combine trust, funding, licences, customer data and payment habits. Permissioned data and AI reinforce the bank's experience or bank-led partnerships. Customers continue to use the bank as the primary decision point. Interoperability permits comparison but relationship quality remains valuable. These are scenario assumptions rather than observations of future outcomes.

Triggers and economic transmission: Services expand into SME accounting/collections, investment and planning. AI lowers routine service expenses while fintech partnerships provide specialist functions. Fixed

technology costs are spread across more relationships. Funding advantage, service and trust can reinforce one another; restrictive ranking can reduce customer benefits. [S27]

Customer data distribution balance-sheet and risk control: Interface and product design remain bank-led. Data processing is bounded by customer rights and regulation. Credit, funding and capital remain at the bank; technology risk extends through suppliers under bank responsibility. Control does not mean ownership of personal data or unlimited use.

Value revenue sharing and bargaining: Banks benefit through lower service/acquisition costs and appropriate underwriting; fintechs earn product or transaction revenues. Bank scale may lower supplier prices, but difficult switching can increase supplier rents. Customer benefit must be shown in total price/return and quality rather than feature counts.

Bank types and customer groups: Large deposit banks can use scale and primary relationships. Small/digital banks can compete through focused service, but expensive acquisition without demonstrated lifetime value can destroy value. Participation banks incorporate contract and compliance requirements into workflows. Development/investment banks should focus on exports, projects, collateral and capital-market ecosystems rather than copying a retail platform. SME integration is useful; customers unwilling to share data or needing support may be disadvantaged.

Profit funding credit capital liquidity and stability: Service costs may fall and fees/relationship revenues rise. Improved risk measurement could reduce losses, but this remains an assumption. Competition can raise deposit costs and lengthen investment payback. Credit expansion still needs capital. Primary cash-flow funding may be more durable, while a common technology failure can impair services systemically.

Second-round effects and feedback: Stronger relationships can generate more permissioned data, more suitable products and lower acquisition costs. The same loop may constrain smaller rivals. Customer resistance to dependence or personalised pricing can shift decisions to independent interfaces and move the system toward B.

Development path: The first two years focus on primary relationship/net contribution measures, supervised AI and assisted access. Years 3–5 develop SME workflows and portable partnerships. Years 6–10 can integrate planning and qualified C infrastructure. This is an investment sequence, not a timing forecast.

Signals transitions and falsifiers: Joint gains in primary collections/salary, durable balances and contribution strengthen A. Growing external decision control and shrinking bank shares strengthen B. Failure to deepen the primary relationship, savings captured by suppliers, or declining welfare would weaken A's benefit case. Portability remains the main uncertainty; invest in quality and transparent contracts.

B The bank as invisible infrastructure

Starting conditions and critical assumptions: Product choice occurs in commerce, accounting, business platforms or a customer-authorised agent. Banks provide standardised licensed risk capacity. Authority, security, complaints and responsibilities are enforceable. Unlimited autonomous agent authority is not inferred from present law. [S14; S20]

Triggers and economic transmission: Permissioned data and reliable APIs enable comparison. Credit offered in an invoice/sales workflow reduces direct bank applications. Acquisition cost can fall while recurring distribution shares and short-lived funding consume the gain. Bank savings may become platform margins.

Customer data distribution balance-sheet and risk control: The interface controls presentation/ranking; lawful data access is distributed. Deposits/participation funds remain at the relevant bank, as do credit allocation, capital and losses. Specific joint security responsibility is distinct from general credit risk sharing. Development/investment banks provide functions within their licence; consumer deposit-taking is not assumed.

Value revenue sharing and bargaining: Interfaces aggregate demand; banks compete with funding and underwriting capacity. Customers benefit only from comprehensive comparison with disclosed conflicts. Strong brands, specialised credit information and diverse distribution restrain platform power. Commissions growing faster than risk-adjusted revenue erode bank value.

Bank types and customer groups: Small banks may access specialised lending without building distribution, but face partner concentration. Low-cost digital banking still requires stable funding. Participation products must be represented correctly by the interface. Development/investment banks can specialise through SME, export and project ecosystems. SMEs may obtain easier access, while businesses outside platforms can become less visible.

Profit funding credit capital liquidity and stability: Distribution costs become more variable and processing scale can improve efficiency. Easier routing can increase price competition and funding beta. Overreliance on interface signals can create adverse selection or common model errors. Capital remains necessary while the bank bears credit risk. Simultaneous platform routing may correlate flows; this is a stress assumption, not a Turkish observation.

Second-round effects and feedback: Successful distribution strengthens platform demand/data advantages and makes bank products more substitutable. Banks can counter through diverse partnerships, specialist models and support. Interface conflicts or security failures can move customers back into bank-led A.

Development path: The first two years use bounded product/partner pilots, recorded authority and termination/complaint design. Years 3–5 introduce independent validation, diverse distribution and selected customer-agent uses. Years 6–10 can allow more continuous routing and links to C if conditions hold. Agent adoption on this timetable is conditional, not forecast.

Signals transitions and falsifiers: Track external origination alongside contribution after risk, balance persistence and renegotiation power. If interfaces cannot direct primary decisions, permissions cannot be sustained or partnership value remains negative, B's scale case weakens. A bank retaining visibility while expanding APIs is an A/B combination. Tie commercial sharing to actual cohort performance to reduce uncertainty.

C Programmable money and financial transactions

Starting conditions and critical assumptions: Legally defined tokenised bank claims, central bank money and financial assets interoperate. Finality, custody, collateral, redemption and privacy are explicit. TCMB research and foreign wholesale applications provide starting evidence; broad Turkish commercial adoption remains a scenario assumption. [S21–S22; S33; S40]

Triggers and economic transmission: Permissioned networks combine payments, asset delivery and collateral; invoices and collections use executable conditions; cross-border settlement connects appropriate money and law. Reconciliation and delay costs can fall. The incremental benefit over a well-designed conventional payment workflow must be demonstrated.

Customer data distribution balance-sheet and risk control: Interfaces can remain bank-led or external. The issuer of the monetary claim remains the relevant bank or central bank; the ledger does not change it. Risk is distributed across credit, liquidity, custody, code/contracts, external information and operations. Stopping, correcting and insolvency rights require prior design.

Value revenue sharing and bargaining: Reconciliation costs may fall while custody, liquidity, collateral and compliance revenues grow. Legacy fees may compress. Control of network standards or liquidity access creates bargaining power; open standards and portable custody constrain it. Speed alone is not lower total cost.

Bank types and customer groups: Deposit banks manage funding and redemption of tokenised claims. Participation banks examine asset, ownership and contractual compliance in digital records. Development/investment banks can support project cash flows, securities, collateral and custody. SMEs can benefit from faster receivables, but ERP integration and reliable data are costly. Consumers require offline access where provided, minimisation and remedies.

Profit funding credit capital liquidity and stability: Real-time data and faster collateral may improve allocation, while automatic collateral calls can amplify stress. Faster cash flows may reduce working-capital lending and transaction balances. Prefunding and continuous settlement may increase peak liquidity. Movement into central bank money affects bank funding according to access/design, rather than producing an automatic deposit-loss forecast. Faster repricing and altered liquidity demand can change monetary transmission; central bank tools and balance-sheet design matter.

Second-round effects and feedback: Faster collections can reduce precautionary cash while automated calls raise cash demand together under stress. A network failure or legal dispute can spread across banks. New liquidity-service costs can absorb efficiency gains; redesigned arrangements can restore them.

Development path: The first two years establish a legal/liquidity laboratory and conventional benchmark. Years 3–5 test bounded wholesale and SME volumes/collateral. Years 6–10 scale only after net benefits and resilience are verified. The report does not prescribe a universal issuance, single network or mandatory migration date.

Signals transitions and falsifiers: Repeated real transactions, explicit finality, accessible liquidity and falling total costs strengthen C. Persistent experimental volume, additional reconciliation between fragmented ledgers or exclusion from intraday credit weaken the broad transformation case. A/B institutions can adopt C; if C fails to scale legally/economically, A/B continue on ordinary rails. Develop transaction-specific options before irreversible single-ledger dependence.

Comparison and common stresses

Table 7 Comparison of three dominant structures

Control / outcome	A Bank platform	B Invisible bank	C Programmable transactions
Primary decision point	Bank ecosystem	Platform/customer agent	Bank or platform; settlement architecture dominates
Data access	Permissioned integration at bank	Authorised flows across parties	Permissioned transaction/asset records; minimisation
Distribution	Bank-led partners	Offers routed across banks	A/B front end; new network access
Balance sheet/risk	Bank; outsourced operations	Bank; interface security duties	Issuer; added liquidity/code/custody layers
Value	Relationship depth and scale	Context and specialist underwriting	Delay/reconciliation/collateral optimisation
Bargaining	Bank scale; supplier counterpower	Interface access; funding/risk counterpower	Standards/liquidity access control
Funding	Primary cash flows may stabilise	Routing can increase beta	Transaction balances/prefunding change
Capital	Still required for credit growth	Still required while bank bears risk	No relief without measured risk reduction
Stability vulnerability	Scale and common suppliers	Correlated flows/common interfaces	Peak liquidity/code/legal finality
Differences by type	Deposits: primary ties; participation: compliance; DIB: specialist ecosystems	Deposits: funding; participation: representation; DIB: specialist credit	Deposits: redemption; participation: asset/contracts; DIB: custody/collateral
Early signal	Activity and primary value rise jointly	External decisions rise; track bank share	Repeated real volume and lower total costs
Falsifier / transition	Primary ties fail→B	Interface trust/economics fail→A	Liquidity/law erase benefit→A/B rails

Unit: structural comparison, analytical inference and scenario assumptions. Horizon 2026–2036. Section 4; F1–F8; Axis analysis. DIB: development/investment banks. Components may coexist; no probabilities or point forecasts.

Table 8 Transmission of common shocks across structures

Stress	A	B	C
Inflation/rates/currency/growth	Beta and long investment payback	Routed funds and lower contribution	Collateral calls/prefunding; credit demand
Cyber / fraud	Loss of primary bank trust	Interface-bank remedy/liability disputes	Keys/code/external data; correction difficulty
Critical supplier outage	Common service loss across banks	One interface propagates across banks	Settlement/collateral access interrupted
Regulatory perimeter change	Data/ecosystem usage boundaries	Licensing/commission/authority redesign	Redemption/protection/finality/collateral
Confidence loss/fast outflows	Salary/trust links tested	Simultaneous ranking-based transfers	Money-type conversion/liquidity queues

Unit: shock-to-vulnerability mapping, no loss forecast. Horizon 2026–2036. S23–S24/S28–S30 and Axis scenarios. Feedback: service loss→trust→funding→credit; quantify internally under common assumptions.

The stress table is not a quantified loss forecast. It identifies vulnerabilities activated by common shocks in each structure. Capital, intraday liquidity, service continuity and customer remedies should be assessed under consistent assumptions. Disruption, fraud and reputation feeding back into funding are central second-round channels. Strong financial buffers do not prevent interface/supplier outages from impairing access; solvency and operational resilience are distinct.

5 A ten-year banking vision

The desired system

The scenarios describe which structure could become dominant; the vision defines the outcomes to protect across those structures. Türkiye's objective should be a resilient system with visible customer decisions and risk bearing, where efficiency gains support service quality and productive finance. Competition, privacy and scale have no single optimal balance, so investment and regulation must be assessed together.

By 2036, customers should understand where money is held and who bears risk; control permissions; compare prices/quality; and obtain remedies during errors and outages. Permissioned SME cash flows should support finance without automatically excluding productive investment because of thin data. Banks should strengthen credit/liquidity management, participation banks contractual compliance, and development/investment banks long-term project and market risk capabilities.

Competition goes beyond the number of banks to substitutability in interfaces, data and infrastructure. Efficiency includes customers' money/time losses, not just technical unit costs. Trust requires purpose limitation, minimisation, security and understandable responsibility. Resilience means maintaining critical services within acceptable impacts under disruption. Inclusion means usable, accessible, appropriately priced financial functions, rather than account opening alone.

Capabilities and trade-offs

Banks need shared customer/product economics, permission management, cash-flow underwriting, real-time treasury, independent model validation, integrated fraud/complaints and tested supplier exit. People capabilities extend beyond developers: legal, risk, finance, product and service teams must make decisions jointly. Relationships may shift from selling products inside one app to providing reliable functions through whichever interface the customer chooses.

Table 9 Trade-offs between vision objectives

Objective / trade-off	Benefit	Condition / cost
Openness / privacy	Comparison and cash-flow lending	Purpose limits, minimisation and consent costs
Scale / competition	Lower unit costs	Substitution/portability; transparent ranking
Speed / consumer protection	Faster payments and credit	Fraud controls, false blocks and appeals
Efficiency / resilience	Specialist provider quality	Independent backup and actual exit costs
Data lending / inclusion	Thin-file business visibility	Assisted data and disparity analysis
Safe settlement / credit-liquidity	Less counterparty exposure	Netting, prefunding and central bank liquidity design

Unit: normative design trade-offs. Target2036. F1–F8; Axis vision. Benefits are not assumed automatic or equally distributed.

Data sharing expands authority and cyber/privacy exposure. Backup infrastructure costs money and offers little resilience if it shares the same failure domain. Instant credit can help SMEs but accelerate bad allocation with unreliable data. Central bank settlement safety must be considered together with liquidity access and lending effects. These trade-offs require cost/benefit records, bounded pilots and stopping rules.

6 Action agenda and investment sequence

The first priority across scenarios is to make investment and accountability measurable. Banks need to combine relationship economics, funding behaviour and partnership contracts; regulators need to identify the licences and providers supporting each service. Fintech distribution should be assessed through transparent ranking and portability, and corporate benefits through cash cycles and authority controls.

Stakeholder priorities

Banks. Over the first two years, prioritise primary-relationship and cohort measures, product-level funding stresses, AI oversight and distribution partnerships with tested exits. These protect relationship value in A, contribution after risk in B and liquidity capacity in C. [A1–A4; F1–F4; F6–F8]

Regulators. Monitor customer authority, loss responsibilities and common-provider dependencies by function. Review licensing and remedies as new intermediaries reach commercial scale. [A5–A6; F3–F4; F6; F8]

Fintechs. Multi-bank integration, disclosed incentives and reliable APIs reduce dependence on one partner. Success needs to include customers' total costs and service quality alongside routed volumes. [A7; F3; F8]

Corporate customers. Begin with ERP, invoice and payment reconciliation; expand programmable-transaction pilots when legal certainty and conventional benchmarks are established. Measure SME cash-cycle benefits separately from banks' peak liquidity needs. [A8–A9; F1; F5]

Inclusive service is a common requirement. Assisted channels, human appeals and disaster continuity need protection throughout the horizon. Appendix D records each action's owner, prerequisites, costs and benefits, and reconsideration trigger in A1–A10. [A10; F6]

Table 10 Stakeholder action and ownership summary

Action / finding	Owner / horizon	Prerequisite	Success / reconsideration
A1 Relationships/cohorts [F1/F3]	Bank strategy/finance; 0–2y	Permissioned IDs and expenses	Primary value; rising activity/falling value
A2 Funding/liquidity [F2/F7]	Bank treasury/risk; 0–2y	Product/maturity/balance panel	Beta/peak outflow; internal tolerance
A3 AI/fraud [F4/F6/F7]	Bank models/security; 0–2y	Data/tests/appeals/stopping	Net benefit/errors; regime/model changes
A4 Partners/exit [F3/F8]	Bank legal/business/risk; 0–2y	Revenue/loss/authority/contracts	Contribution; concentration/commission
A5 Dependencies [F4]	Authorities; 0–2then3–5y	Functions and subcontractors	Coverage/exercises; shared failure domains
A6 Authority/liability [F3/F6/F8]	Authorities; 0–2/3–5y	Functions and incidents	Revocation/remedies; material agent volume
A7 Portable distribution [F3/F8]	Fintech product/compliance; 0–2y	Consent/minimisation/APIs	Customer cost; incentives/errors worsen
A8 Cash/authority [F1/F5]	Corporate finance/IT; 0–2y	ERP and data quality	Receivables/errors/cash; outage/permissions
A9 Programmable pilot [F5]	Bank/fintech/corporate; 3–5y	Finality/benchmark/collateral	Cost/peak liquidity; benefit disappears
A10 Inclusion [F6]	Banks/authorities/fintechs; 0–10y	Access/appeals/group analysis	Safe access; unexplained disparities

Unit: action records; years from cutoff. Appendix D A1–A10 contains cost/benefit mechanisms. Thresholds require internal calibration or are judgmental triggers, not invented sector standards.

Investment sequence and reconsideration

Relationship measurement, permission records, API reliability, critical-service maps and liquidity capabilities have value in several scenarios and should form the first investment wave. Customer agents, new platform distribution and tokenised collateral are conditional options that need demonstrated benefits. Commitment to a single partner or non-portable infrastructure requires explicit exit costs and alternatives.

Monitoring should assess digital activity alongside primary contribution, deposit behaviour alongside funding costs, and technology savings alongside errors, remedies and disruption. Appendix D's indicators are not calibrated national thresholds. Triggers such as two quarters of falling primary contribution are judgmental; H01's 3.25-percentage-point break-even beta applies only to its chosen assumptions. Institutional history, risk appetite and binding reporting obligations determine actual tolerances.

7 Conclusion

Türkiye's digital future cannot be inferred from more mobile activity alone. Decisions need to connect the institution directing customer choices, authority over data and the risk carried by bank capital in return for income. The three scenarios describe different dominant structures; none removes the need for macro stability, legal certainty and resilience.

Near-term bank value centres on cohort/relationship measurement, full-cost investment analysis, funding stress and tested partnership exit. Regulators need functional responsibility and dependency maps; fintechs need portable transparent distribution; corporates need cash-cycle and authority controls. Programmable finance should be tested against liquidity and finality as well as speed. Revising the view when evidence weakens a mechanism is a research outcome, not a breach of a forecast commitment.

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Appendix A Data and research methods

Claim strength and research design

Public evidence is sufficient to assess direction and legal boundaries, but insufficient to estimate each bank's net profitability or loyalty effect. TBB channel statistics, TCMB infrastructure releases, TÜİK access data and regulations describe different populations. Combining them as a single customer universe creates false precision. Product-level deposit repricing, supplier contracts, acquisition cohorts and losses associated with external interfaces are not publicly available. The report supports directional strategy, contract design and data priorities; institution-specific budgets and capital amounts require internal calibration.

The source hierarchy is Turkish public institutions and the Official Gazette; sector organisations with defined coverage; international bodies and foreign regulators; academic research and institution disclosures; then news for event context. Critical findings are not based on news. Technology narratives in annual reports are management disclosures, not an independently identified impact estimate with the status of audited financial accounts.

Claims are labelled **G observed**, **H calculated**, **K institutional forecast or announced plan**, **A analytical inference**, or **V judgmental scenario assumption**. The TBB total is G; its annual change H; the ECB's future implementation timetable K; a bargaining-power implication A; and the funding exercise's beta increase V. Source, calculation and evidence registers retain these distinctions. A technically successful pilot is not evidence of commercial volume or profitability.

Methods comprise definition reconciliation, mechanism analysis, contrary-evidence searches, purposive international comparison, structural scenario construction and transparent balance-sheet sensitivity. No forecasting model is fitted. Out-of-sample predictive accuracy or chronological backtesting is therefore not claimed. With internal data, actions A1–A3 propose starting with simple constant-beta/current-cost benchmarks and testing in time order.

Definition and revision checks

TBB digital tables aggregate bank-customer records, not unique Turkish residents. Individual/corporate populations, three-month activity/historical registration, and monthly onboarding flows/period-end records are separated. Same-month applications and completions are not matched cohorts, so their ratio is not reported as conversion. Classification and historical revisions in onboarding also limit interpretations of channel movements as pure customer preference. [S08–S09]

The June digital report's opening note refers to 35 internet and 29 mobile banks, while a historical-summary footnote refers to 31 internet banks. This discrepancy has not been reconciled with the publisher; no balanced-panel growth or per-bank averages are produced. Channel components sum to 129.336 million versus the published total of 129.335 million. The difference of one thousand records is retained as a rounding discrepancy. The small March-to-June decline does not establish saturation. [S08]

An official indexed BDDK July 2026 sector table was read, but a secure direct download of the underlying bulletin was not verified. Its numbers are excluded from the report's numerical starting balance sheet. The illustrative model is not portrayed as calibrated to BDDK ratios. Participation banking is not added to TBB by inventing a sector total. Until a verifiable bank-type panel is available, comparisons by type are functional and contractual. [S10]

Nominal transaction values do not establish real service growth. Quarterly flows are not deflated by one month's annual CPI change. Counts and nominal values are separate. Policy rates, new-business deposit rates and stock funding costs differ. Percentage growth, percentage point differences, asset-return basis points and

net-interest-margin denominators are kept distinct. International numbers are not harmonised into an adoption ranking; mechanisms and transfer conditions are compared.

Table 11 Data gaps and supported decisions

Gap / boundary	Affected claim	Alternative / decision limit
No unique sector customer panel	F1 relationships / penetration	Permissioned bank cohorts; no population ratio
No product beta/outflow panel	F2/F7 profit and liquidity	H01 sensitivity; calibrate amounts internally
Partner contracts not public	F3/F8 shares / market power	Contract review; no estimated revenue shares
No critical supplier network/shares	F4 common risk magnitude	Functional maps and actual switching exercises
TBB coverage footnotes differ	Balanced-panel interpretation	Retain published total; publisher reconciliation pending
Underlying BDDK bulletin not verified	S10 starting balance sheet	Numerical bulletin claims excluded
No inclusion/rejected-loan microdata	F6 distributional effects	Assisted pilots; distinguish causes of group gaps

Unit: data-to-decision mapping. Source review, S08–S10 and F1–F8; status30Sep2026. Gaps constrain quantified institution decisions rather than the mechanism analysis.

Sources retain stable S identifiers. Each quantitative observation is linked to series, period, unit, location, coverage, access date and version. Selected factual data and summaries are delivered, not complete third-party PDFs or the supplied preceding reports. Captured files have SHA-256 records; uncaptured sources have verification status. Redownloading the same URL does not guarantee the same version.

Table 12 Dictionary of principal series and concepts

Series / ID	Unit and scope	Period / version / transformation
D202606 / S08 active digital	Thousand bank records; participation excluded; 3 month login	Jun 2026; DT22/Aug 2026; /1000→millions
D_mobile_* / S08	Active/historical registration; not unique people	Jun 2026; printed iii; ratio H03
M_2026-Q2 / V_2026-Q2	Million transactions / nominal TRY bn flow	Q2; printed iv; annual change; no deflation
R_* / S09; R_A8_* / S47	Monthly application/completion records; 26 banks	Jul/Aug 2026; DT26; no cohort ratio
C_* / S11; POL / S12	CPI percent / policy percent; distinct concepts	Aug /10Sep2026; 58290/DUY38
I_* / S13	Internet percent ages 16–74; not banking	2026/2025; 58006; gap in percentage points
UKC / S38; UKAI/UKCL / S39	Brand connections / respondent firms / provider relationships	Dec 2025 /2024; no Turkish ratios
H01 / H02	Total-asset basis points / hypothetical units-days	Undated judgmental V; calculated H; not forecasts
Primary relationship / supplier map	Proposed internal measurement concepts	No current national series; calibration needed

Sources: observations.csv and sources.json/csv; access 30Sep2026. Full periods, locations, coverage, versions and URLs accompany numerical observations; SHA-256 is recorded for captured files.

Appendix B Calculations and sensitivity

H01 — Pre-tax return on total assets bridge. Let A be total assets, D deposits, c operating expense/assets, s gross expense savings, p customer pass-through, t extra technology/governance expense/assets, $\Delta\beta$ incremental deposit beta and Δr the common rate shock. With a fixed balance sheet and other effects unchanged: $\Delta ROA = c \times s \times (1 - p) - t - (D/A) \times \Delta\beta \times \Delta r$. Multiply by 10,000 for basis points. This is a total-asset pre-tax impact, not net interest margin. Asset repricing, credit loss, currency, taxes, growth, behavioural balance changes and capital effects are omitted and must be added for real decisions.

Assumptions are c=3%, s=15%, p=30%, t=0.12%, D/A=60%, $\Delta\beta=0.10$ and $\Delta r=0.10$. All are V. Gross savings are 45 basis points, customer pass-through 13.5 and additional technology expense 12, leaving 19.5. Funding adds 60 and the net impact is -40.5. Break-even $\Delta\beta$ divides the net benefit by $[(D/A) \times \Delta r]$: 0.0325, or 3.25 percentage points in the beta ratio. An increase of 0.10 in beta is not a direct 10 percentage point increase in the deposit rate. Here it adds 10% of a 10 percentage point shock, or one percentage point to the rate.

Table 13 H01 funding cost sensitivity

Incremental beta	Rate +5pp	Rate +10pp	Rate +15pp
5 percentage points	15 bp / net+4.5 bp	30 bp / net-10.5 bp	45 bp / net-25.5 bp
10 percentage points	30 bp / net-10.5 bp	60 bp / net-40.5 bp	90 bp / net-70.5 bp
20 percentage points	60 bp / net-40.5 bp	120 bp / net-100.5 bp	180 bp / net-160.5 bp

Unit: basis points of total assets; cells show extra funding expense / net pre-tax asset impact. Undated V/H01. Deposits/assets 60% and net digital benefit 19.5 bp fixed. reproduce.py; not observations, forecasts or confidence intervals.

Separate sensitivity uses s=5%/15%/25% at c=3%, giving 15/45/75 basis points gross. Customer pass-through can vary across 0%/30%/60% and extra technology expense across 6/12/24 basis points. These are judgmental ranges, not confidence intervals or a joint probability distribution. Different costs, deposits/assets or shocks change the 3.25 threshold. Participation funding requires a contract-specific mechanism; H01 does not assume an identical interest contract.

H02 — Liquidity example. If 80% of 100 gross daily units are legally/effectively netted, net settlement is 20 units. Fully prefunded gross atomic settlement without intraday credit/reuse illustrates 100 units, a ratio of five. It is not an observed network outcome. A separate working-capital example shortens collection delay for 100 daily units from two days to 0.25: receivables fall from 200 to 25, releasing 175. Volumes and timing are assumptions. The two examples must not be added into a sector estimate.

H03 — Observation transformations. Percentage changes are $(\text{latest/comparator}-1) \times 100$, absolute changes latest-comparator, and the internet-use gender gap male-female in percentage points. TBB thousands convert to millions by division by 1,000. Nominal TRY flows are not deflated. Source values are retained; rounding occurs at presentation. observations.csv records periods and units, calculations.json the results, and reproduce.py formulas plus independent Decimal arithmetic validation. No chronological forecasting test is performed because there is no forecasting model.

Appendix C Evidence records for findings

Table 14 Evidence and confidence for critical findings

Finding / class	Evidence / calculation	Uncertainty / confidence
F1 Relationship#records; G/A	S08; H03; no deduplication	Definition: high; economic size unknown
F2 Savings/funding; A/V/H	S31; H01; S30 counterevidence	Mechanism: medium-high; no Turkish beta
F3 Interface/balance sheet; A/G	S14art13; S26	Legal: high; shares/outcomes conditional
F4 Common providers; A	S28–S29; proposed network map	Mechanism: high; local network/shares absent
F5 Settlement/liquidity; A/V/H	S33/S40/S42; H02	Trade-off: high; local net effect unknown
F6 Two-sided inclusion; A	S13/S32/S44; H03	Risk: medium-high; no local causal estimate
F7 Macro/digital interaction; A	S11/S12/S23; H01 stress	Macro link: high; attributed magnitude unknown
F8 Gain sharing; A	S27/S34–S40; contract analysis	Mechanism: medium; revenue shares unestimated

Unit: reasoned qualitative confidence; 30Sep2026. Appendix C and claims.json/csv contain counterevidence, alternatives, conditions, falsifiers and decisions.

Confidence levels are reasoned qualitative assessments of evidence and scope. “High” indicates strong primary support for a definition or mechanism; “medium” indicates material contextual/alternative explanations. An unmeasured Turkish effect remains unsuitable for a quantified decision even if its mechanism is credible. Full records in claims.json/csv include mechanism, counterevidence, alternatives, conditions, falsifiers and decision effects.

F1 From digital activity to the primary relationship

Mechanism: A person can log into several applications, place savings where rates are attractive and make daily payments elsewhere. Records may grow without proportional growth in stable funding or cross-product revenues. **Evidence:** TBB's non-deduplication and login-based activity definitions require this distinction.

Counterevidence: A frequently used mobile service can deepen salary, payment and investment relationships in one bank. **Alternative explanation:** Growth can reflect reporting coverage, campaigns or login frequency rather than relationship change. [S08]

Conditions: The distinction matters where multiple banking and product splitting are material. **Falsifier:** A deduplicated panel showing sustained joint growth in activity, primary cash flows, persistent balances and net value would reduce its economic importance for those banks. **Decision implication:** Use permissioned cash-flow measures, period-average balances and 90/180-day cohorts. Do not classify unverifiable customers as secondary. **Confidence:** High in the definitional distinction; the Turkish economic magnitude is unmeasured.

F2 Savings assessed together with funding

Mechanism: Technology lowers servicing costs while making offers visible and transfers easier. Deposit beta is the fraction of a market/policy rate change transmitted to a deposit rate. A single beta is misleading when level, maturity or product mix changes. **Evidence:** The August 2025 revision of Koont, Santos and Zingales reports greater US outflows and pass-through at banks offering mobile apps and brokerage, while deposit-franchise value is ambiguous depending on service costs. **Counterevidence:** Trust, salary/collections, protection and quality can limit switching. [S31]

Alternative explanation: Customer mix, duration and fragility can affect both digital adoption and deposit behaviour. **Conditions:** Comparison, transfer and access to substitutes must jointly improve for rate-sensitive balances. **Falsifier:** Unchanged local beta and outflow speed after controlling for product, customer and regime would weaken the funding channel. **Decision implication:** Include customer pass-through, interface commission, governance and rate scenarios in digital investment analysis. **Confidence:** Medium-high in the mechanism; the Turkish coefficient remains unverified.

F3 Bargaining between the interface and the balance sheet

Mechanism: A platform directing applications and ranking can distribute business across banks. Weak direct customer access can give it bargaining power; commissions can reduce the return on bank capital while credit selection and losses remain with the bank. **Evidence:** Turkish rules retain credit decisions at the bank; BCBS already describes distributed and relegated banking. **Counterevidence:** Licensing, funding, trust and crisis service capacity create bank bargaining power. [S14; S26]

Alternative explanation: Low margins can result from poor underwriting or excessive incentives rather than platform power. **Conditions:** Concentrated interfaces and substitutable bank products make the channel stronger. **Falsifier:** Portable authority, a strong bank relationship and diversified distribution may preserve contribution even if the bank becomes less visible. **Decision implication:** Contract for data access, customer support, repricing, bounded loss sharing and continuity after termination. **Confidence:** High in legal separation; market power is conditional.

F4 Systemic exposure through shared suppliers

Mechanism: A common identity, network, cloud or foundation-model failure can affect several banks. Common model updates can generate correlated errors. **Evidence:** BCBS resilience and FSB AI analyses identify these dependencies. **Counterevidence:** Specialist providers can offer stronger security and continuity than a bank alone; genuinely independent backups help. **Alternative explanation:** Common outages can originate in telecoms, energy or identity infrastructure rather than direct supplier concentration. [S28–S29]

Conditions: Exposure matters where critical services cannot rapidly operate elsewhere or backups share the same failure domain. **Falsifier:** Tested independent continuity, data portability and model substitution can limit impact despite concentration. **Decision implication:** Extend mapping from supplier names to subcontractors, regions, networks, identity and model versions; stress customer-service loss. **Confidence:** High in the general mechanism; the Turkish network and shares are unknown.

F5 Settlement savings versus intraday liquidity

Mechanism: Conditional simultaneous transfer can reduce counterparty exposure and collection delays. Moving from netted to gross atomic settlement can require more prefunding without intraday credit or reuse. **Evidence:** BIS architecture, Agorá and Pontes link tokenisation with central bank and bank money; effects depend on design. **Counterevidence:** Preserving netting, collateral mobilisation, queues and credit can lower liquidity needs. [S33; S40; S42]

Alternative explanation: Faster cash cycles may result from ordinary instant payments and better invoicing rather than tokenisation. **Conditions:** Legal certainty, suitable collateral, interoperability and actual volume are necessary. **Falsifier:** No improvement over a well-designed conventional system in total cost or net liquidity use weakens the general investment case. **Decision implication:** Measure peak liquidity, encumbrance time, failed-transaction remedies and customer working-capital cost alongside speed. **Confidence:** High in the design trade-off; Türkiye's net effect is unmeasured.

F6 Data as both an inclusion and exclusion channel

Mechanism: Permissioned collections/payment data can reveal repayment capacity for thin-file or weakly collateralised SMEs. Models can also systematically exclude weak data trails, irregular incomes or inadequate devices. **Evidence:** TÜİK's access survey has age limits; US mortgage research shows unequal distribution of machine-learning gains. Earthquake-area exclusions in Findex's Turkish sample also caution against assuming national averages cover vulnerable populations fully. [S13; S32; S44]

Counterevidence: Appropriate alternative data and assisted processes can reach customers excluded by older methods. **Alternative explanation:** Rejection gaps can reflect income/risk differences; approved-loan samples do not show rejected customers' performance. **Conditions:** Unequal access to data and appeals matters. **Falsifier:** A controlled, audited pilot improving access and lowering total costs and inappropriate rejection gaps would weaken exclusion pressure. **Decision implication:** Combine human appeals, accessible design and privacy-preserving group analysis with the economic case. **Confidence:** Medium-high in distributional risk; Turkish group effects are unmeasured.

F7 The macro regime changes technology economics in Türkiye

Mechanism: Inflation and rates jointly affect search, deposit beta, credit loss and foreign-currency technology expenses. The same infrastructure can deepen relationships in stability and become a liquidity/pricing tool under volatility. **Evidence:** Current CPI and policy observations and TCMB credit/funding analysis establish the relevance of the regime. **Counterevidence:** Routine automation and good risk information can remain valuable during instability. [S11–S12; S23]

Alternative explanation: Bank differences can reflect management, products or public mandates. **Conditions:** Short funding, long assets and currency-sensitive technology costs sharpen the trade-off. **Falsifier:** Controlled analysis showing unchanged project returns and deposit behaviour across regimes would reduce its strategic importance. **Decision implication:** Stress rates/currency, credit loss and supplier costs together instead of using one nominal budget path. **Confidence:** High in the macro connection; the digital-specific magnitude awaits verification.

F8 Competition determines who captures efficiency

Mechanism: Savings can initially raise margins; competition, portability and transparent ranking pass price/quality gains to customers. Dominant interfaces or suppliers can capture the difference through commission or licence costs. **Evidence:** BCBS and the country examples establish multilateral structures, but there is no direct Turkish gain-sharing estimate. **Counterevidence:** Reliable low-cost interoperable infrastructure can benefit banks, suppliers and customers simultaneously. [S27; S34–S40]

Alternative explanation: Fees can change because of rates, regulation or product mix rather than digital costs. **Conditions:** Genuine options, switching ability and transparent contracts matter. **Falsifier:** Falling quality-adjusted customer cost with reasonable supplier prices and preserved risk-adjusted bank contribution would weaken a narrow rent-capture argument. **Decision implication:** Measure interest, fees, time, fraud losses and quality together. **Confidence:** Medium in the mechanism; shares are unmeasured.

Appendix D Implementation monitoring and publication information

Indicators and calibration

Table 15 Monitoring definitions data needs and triggers

Indicator	Definition / data	Frequency	Trigger / status
Primary contribution	Primary cash-flow cohort; contribution after risk/cost	Quarterly	Two declines+rising activity: Judgmental
Deposit beta/outflow	Product/maturity/currency/customer; stock/flow separate	Weekly/daily /stress	Internal tolerance; calibration needed
Partner share	Commission from risk-adjusted revenue; cohorts	Quarterly	Shrinking contribution/dependence: Internal/judgment
Critical dependence	Subcontractor/identity/region/network/model map	Change+quarterly	No independent continuity: Review
AI net savings	Gross-governance-rework-remedies	Monthly/quarterly	Quality-adjusted benefit loss: Internal
Fraud/false blocks	Transaction losses and legitimate rejections	Daily/monthly	Risk/customer-harm limits: Internal
Group access/appeals	Risk-comparable access and human appeal results	Quarterly	Unexplained gap: Judgmental review
Token total costs	Benchmark process costs and actual volumes	Pilot/quarterly	No benchmark advantage: Narrow option
Peak liquidity/encumbrance	Intraday funds and collateral duration	Daily/stress	Cost outweighs benefits: H02 calibration
Revocation/complaints	Effective withdrawal, resolution and remedies	Monthly/incident	Legal/contractual rules take precedence

Unit: measurement definitions and proposed cadence. F1–F8/A1–A10. National thresholds are not empirically calibrated. H01 3.25pp is only illustrative break-even, not a regulatory limit.

No national loyalty or technology concentration threshold is empirically calibrated here. “Internal tolerance” means a value to be set from risk appetite and historical evidence. Falling primary contribution in two consecutive quarters while digital activity rises is a **judgmental** investigation trigger, not an automatic investment cancellation rule. The 3.25 percentage point beta threshold is a **calculated break-even point within H01’s selected assumptions**, not a Turkish empirical threshold.

Establish baseline distributions by product, customer group and macro regime first. Update thresholds using actual cost, customer harm, test error and liquidity impact. Applicable notification requirements or contracted service levels take precedence over judgmental indicators. Monitoring should show tail stress, distributional gaps and common dependence as well as averages.

Action implementation details

A1 Banks — Primary relationship and cohort economics, first two years. Strategy/finance and customer analytics jointly own lawful deduplication, salary/collections classification and relationship expenses. Integration/control costs can reduce misallocated acquisition budgets. Success means usable 90/180-day customers, primary cash flows and contribution after credit/fraud loss. Rising digital records with falling primary contribution trigger campaign and contract review. [F1; F3]

A2 Banks — Funding beta and continuous liquidity, first two years. Treasury/ALM and risk measure price/outflow responses by product, maturity, currency and customer group. Prerequisites are period-average balances, campaigns/rates/currency histories and collateral access. Analytics/buffer costs provide earlier detection. Use chronological comparison against a constant-beta benchmark. Responses beyond internally calibrated tolerances trigger pricing, maturity and liquidity revisions. Participation funds require their own contractual model, respecting TCMB profit-share and stock/flow distinctions. [F2; F7; S46]

A3 Banks — AI and fraud governance, first two years. Risk/validation, security and product owners establish provenance, proper train/test separation, human appeals and stopping authority. Control expenses can reduce rework, mistakes and remedies. Measure net savings, risk-adjusted performance, false blocks, complaints and relevant group outcomes. Regime/model-version changes or deteriorating disparities trigger revalidation. [F4; F6; F7]

A4 Banks — Distribution contracts and exit, first two years. Business development/legal/risk need permission records, bank–customer contracts and partner-level revenue/loss data. Diverse integrations cost more but improve renegotiation and continuity. Success is contribution after risk, sustained customer service and tested data/workload transfer. Excessive interface concentration or commission burden relative to internal limits triggers alternatives. [F3; F8]

A5 Regulators — Functional supplier-dependency maps, first two years and deeper in years 3–5. BDDK, TCMB and other authorities act within their respective mandates to improve definitions and coordination. Privacy-preserving shared definitions and subcontractor information are prerequisites. Reporting burdens are balanced against earlier systemic detection. Measure coverage and independent switching exercises. Broad common-failure exposure or material incidents trigger concentration review; identical statutory powers are not assumed. [F4]

A6 Regulators — Customer authority and responsibility, first two years; new agents in years 3–5. Relevant authorities clarify licensing, ranking conflicts, complaints and remedies. Functional inventories and incident records are prerequisites. Compliance costs can reduce mis-selling and unresolved liability. Measure effective revocation, complaint resolution and customer understanding of risk bearers. Material new-agent volume or systematic harm triggers perimeter review. [F3; F6; F8]

A7 Fintechs — Portable multi-bank distribution, first two years. Product/compliance teams establish transparent rankings, revenue models and reliable APIs. Valid permissions and minimisation are prerequisites. Multi-bank integration can improve access and reduce dependence. Measure total customer cost, completion quality, complaints and switching capacity. Commission-driven rankings or rising errors trigger incentive/product redesign. [F3; F8]

A8 Corporate customers — Cash cycles and authority, first two years. Finance/IT integrate ERP, invoicing and payment reconciliation, multi-bank visibility and dual authority. Data quality and permission management are prerequisites. Integration expenses can lower delays, errors and financing costs. Measure overdue receivables, payment errors, available cash and switching costs. Outages or broader permissions trigger review of limits and backup processes. [F1; F5]

A9 Banks fintechs and corporates — Programmable transaction pilots, years 3–5. Treasury, legal and business owners require finality, conventional benchmarks and eligible collateral. Pilot expenses purchase the

option to reduce delays/reconciliation costs. Measure total process costs, peak liquidity, encumbrance and failed-transaction remedies. Stop or redesign if gross settlement liquidity consumes the benefit. [F5]

A10 Banks regulators and fintechs — Inclusive services, first two years and continuing. Service/product governance teams build accessibility, assisted channels and human appeals. Privacy-preserving group/cohort analysis and disaster continuity are prerequisites. Service costs support safe use and productive finance. Measure access, appropriate rejection/appeals and fraud losses alongside cost. Unexplained worsening by age, income, region or business type triggers corrective work. [F6]

Publication information and verification record

Table 16 Verification record and effects of open gaps

Check	Status / scope	Effect / necessary action
Primary sources/definitions	Sources read; selected facts checked against source	TBB coverage discrepancy and some versions remain limited
H01–H03 arithmetic	Standard arithmetic plus independent Decimal check	Reproducible through reproduce.py
Evidence/alternatives	Full F1–F8 records; observed/inferred/assumed separated	No local causal magnitude claim
Scenario/completeness	Same 9 fields per scenario; common stresses/transitions	Probabilities/local losses uncalibrated
Bilingual numerical consistency	Shared data/tables and numerical-claim checks	AI-assisted translation, not independent review
PDF presentation	Final page images and text checks	Production log in delivery package
BDDK bulletin / TBB panel	Underlying BDDK file and TBB35/31: verification pending	BDDK numbers excluded; no balanced-panel trend
Bank microdata/effects	Beta/cohorts/contracts/networks/groups: verification pending	Internal budget/capital calibration required

Unit: checks and limitations; 30Sep2026. Performed by the preparing AI assistant. No unperformed independent review is claimed; actual technical outcomes are recorded separately.

AI assisted language review and source checking, as well as text, translation, calculations and document preparation. No private bank or customer data were processed. Recorded technical checks are not presented as independent human or institutional review. The responsible editor is Belya Arda YILDIZ.

No information about external funding or relevant conflicts was supplied during preparation; absence of funding/conflicts cannot be inferred. A public publication licence has not been specified. Third-party text, data and marks remain subject to their owners' rights; delivery does not grant them an open licence. Redistribution limits are explained in README. New data or material errors require a record of claim ID, old/new value, affected conclusions and version; substantive revisions require reconsidering the executive summary.

Appendix E Relationship to preceding publications and literature

Relationship to Axis publications

Axis emphasises a decision question and horizon, explicit definitions and limitations, and findings translated into observable triggers. This study applies that approach to contracts and balance-sheet mechanisms when customer access and risk bearing separate. [S01]

The preceding Turkish banking report examined macro paths for 2026–2030 with a structural extension to 2035. This study retains macro instability as a stress applicable to every structural future while shifting scenario distinctions to control of the customer, data, distribution and settlement. Updates released after the preceding PDF's 2 August 2026 cutoff include TBB June statistics, the 3 August Digital Turkish Lira ecosystem announcement, the September policy decision and the 21 September Pontes launch. The preceding PDF's preparation date and the website's 4 August publication date are recorded separately. [S03; S08; S12; S22; S40]

The global banking report's treatment of technology, resilience and regulatory fragmentation is developed further through Türkiye's high nominal rates, multiple banking relationships and service banking rules. The contribution is not a claim to have discovered digital banking risks first. It is an account of how the channels interact and how that interaction changes decisions. [S04]

Contribution tested against the literature

BCBS already discussed better, new, distributed, relegated and disintermediated banks in 2018. Scenarios A and B reconstruct relevant elements under Turkish conditions. C adds the changing architecture of money and settlement. BCBS 2024, the FSB AI assessment and the BIS monetary architecture discussion support the mechanisms. This study combines control rights, funding economics and responsibility in a single decision framework. [S26–S29; S33]

Table 17 From existing literature to decision contribution

Existing framework	Addition in this report	Limit
BCBS2018/2024 [S26–S27]	Link A/B control map to Turkish service banking	No claim to a new global bank taxonomy
Depositor behaviour [S30–S31]	Savings + pass-through + governance + funding bridge H01	Turkish beta not estimated
BIS / Pontes [S33; S40; S42]	Test SME receivables and bank peak liquidity jointly	H02 is not an observed benefit estimate
Inclusion / AI [S29; S32; S44]	Connect relationships, thin data and disaster sampling to monitoring	No local causal group estimate

Unit: qualitative comparison. Literature2018–2026; cutoff 30Sep2026. Sources: cited studies and Axis analysis. Originality concerns application and analytical connections.

Originality is bounded by three practical outputs: measurable indicators between digital records and the primary financial relationship; a calculation bridge linking operating savings to funding, distribution and governance costs; and a joint analysis of programmable settlement's effects on SME cash cycles and bank intraday liquidity. These are analytical proposals applicable to Türkiye, not newly estimated causal coefficients from Turkish microdata.