VISA & MASTERCARD IN THE CBDC ERA

A Strategic Roadmap for Leadership, Reinvention & Scalable Growth

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1. Executive Vision: From Rail Operators to Orchestration Platforms

As CBDCs start to shape the future of money, global card networks enter a decade defined less by competition over transactions and more by competition over orchestration, intelligence, and interoperability.

In this context, Visa and Mastercard are not traditional payment companies; they are trust infrastructures. Their strength does not come from plastic cards or interchange fees, but from being the world's most reliable link for commerce.

CBDCs do not lessen this role. They enhance it.

As digital sovereign money develops, the commercial opportunity lies not in defending traditional territory but in transforming the network from a payment processor into a programmable, interoperable digital-value ecosystem.

This roadmap outlines how such a transition could unfold – not as a set of instructions, but as a strategic vision informed by CBDC behavioural science, network economics, and the changing architecture of digital finance.

2. Reframing CBDC: Not a Competitor, a Structural Shift in User Behaviour

CBDCs influence consumer expectations rather than market share dynamics.

My research demonstrates a consistent behavioural pattern across economies:

- Adoption begins gradually, then speeds up as digital salaries, utilities, and merchants incorporate CBDC.
- Early adoption is led by digitally literate, trust-focused groups – the same cohorts already most active on card networks.
- Users usually add CBDC rather than replacing existing payment tools in the initial years.
- The primary predictor of CBDC adoption is not macro variables, but habit formation and trust.

From this perspective, Visa and Mastercard are positioned to act as the interface through which CBDC becomes usable, contextual, and valuable.

CBDC is not a new competitor in the payments market; it is a new asset class within the existing digital payment infrastructure. Those who coordinate it gain a greater strategic advantage than those who accept it.

3. Competitive Landscape: A Moment to Expand, Not Defend

The competitive radar reveals a structural asymmetry:

- CBDCs bring **programmability** but lack merchant depth.
- BigTech brings **integration** but lacks regulatory trust.
- Fintechs bring **speed** but lack global reach.
- Visa and Mastercard bring **trust, interoperability, merchant scale, and dispute infrastructure** – none of which CBDCs or BigTech can replicate with equal credibility.

This positions Visa and Mastercard as natural orchestrators of a multi-CBDC future.

Their advantage shifts from being solely transaction volume to serving as the routing, identity, analytics, and cross-border layers for sovereign digital currency.

Credit cards once dominated the front end of payments; now, Visa and Mastercard can command the backbone.

CBDCs are not inherently programmable money; central banks prohibit embedding conditions directly into the currency. However, CBDCs enable programmability at the application layer – where card networks like Visa and Mastercard can develop smart, automated, value-added payment logic.

4. Strategic Pathway 1: Interoperability as a Global Service

No central bank is creating cross-border interoperability for CBDCs worldwide. Yet, commerce stays global.

Visa and Mastercard may find themselves in a position to:

- interpret and harmonise CBDC technical standards,
- connect national CBDCs across currencies and regulatory environments,
- embed programmable FX conversion into wallet frameworks,
- integrate AML, fraud, and risk analytics into CBDC flows.

In a fragmented CBDC environment, the biggest bottleneck turns into the most significant business opportunity.
Cross-border digital currency platforms can evolve into a high-margin, high-trust infrastructure service.

This frames the networks not as card schemes but as operators of digital currency infrastructure – a much broader strategic scope.

5. Strategic Pathway 2: Programmability & Smart Payment Intelligence

Programmable money enables payments with conditions, logic, and automated processes.

CBDCs provide programmability at settlement; Visa and Mastercard can enable programmability at scale.

Examples of value-added layers include:

- programmable loyalty triggers,
- automated refunds & escrow logic,
- subscription self-adjustments tied to usage metrics,
- corporate treasury automation,
- merchant-specific smart discounts,
- dynamic FX routing conditions,
- automated compliance checks for regulated industries.

In this vision, programmability becomes the **new frontier of revenue diversification**.

The settlement shifts to CBDC.
However, the payment business logic remains a commercial service, and Visa/Mastercard are best placed to host it.

6. Strategic Pathway 3: Merchant Ecosystem Rewiring

Across all models and simulations, one insight is universal:

CBDC adoption follows merchant acceptance – not the other way around.

Merchants determine the pace at which digital money becomes real money.

Visa and Mastercard already own:

- the merchant onboarding infrastructure,
- terminals, API gateways, and checkout experiences,
- data flows between consumer and merchant,
- fraud, dispute, and liability frameworks.

By positioning CBDC acceptance as a **natural extension** of their existing merchant stack, networks can ensure:

- CBDC payments still flow through their rails,
- merchants rely on them for risk mitigation and settlements,
- CBDC becomes an additional *volume source*, not a displacement.

In this model, Visa/Mastercard do not incur transaction losses.
They **gain more nodes in the ecosystem**.

7. Strategic Pathway 4: Consumer Integration & Habit Formation

Consumer behavioural segmentation shows that CBDC adoption is "clustered", not uniform.

Segments A–B (digitally literate, trust-oriented savers) emerge as frontrunners.
Segments C–E (cash-heavy, low-tech) adopt later.

A unified CBDC onboarding strategy might mirror:

- Phase 1 – **convert the innovators** by offering CBDC-linked cards and hybrid wallets.
- Phase 2 – **support the majority** with contextual in-app explanations, rewards, bundles.
- Phase 3 – **convert the hesitant** using reputation, trust scores, and assisted interfaces.

Visa and Mastercard are well-positioned to design CBDC experiences that feel familiar, thereby lowering adoption barriers.

When CBDC feels like "just another balance in my Visa/Mastercard wallet," the migration curve becomes a commercial lever rather than a threat.

8. Strategic Pathway 5: Data, Trust & Systemic Intelligence

CBDC provides a real-time, high-fidelity overview of financial flows.
But raw data alone is not intelligence. Intelligence arises from:

- risk scoring,
- behavioural analysis,
- merchant segmentation,
- liquidity-pattern tracking,
- trust dynamics monitoring,
- anomaly detection.

The card networks already operate some of the world's most sophisticated fraud and risk engines. Applying these capabilities to CBDC can transform them from mere payment processors into partners for financial stability.

In a trust-sensitive digital currency environment, the ability to "read" the system is essential.

Visa and Mastercard possess the scale, talent, and infrastructure to become that entity.

9. Operating Model Evolution: From Network to Ecosystem

The organisational shift needed is not defensive – it is expansive.

- **Product teams** evolve toward programmable commerce design.
- **Risk teams** expand into CBDC behavioural analytics.
- **Partnership teams** integrate with central banks, regulators, fintechs, and BigTech ecosystems.
- **Technology** moves toward API-first, modular, CBDC-ready architectures.
- **Governance frameworks** adapt to handle real-time digital money flows.

This is not a move away from being payment networks.
It is a transition into becoming the operating system of global digital value.

10. KPIs & Timeline: A Vision Oriented to Acceleration

Sample positioning indicators:

- % of merchants accepting CBDC through Visa/MC rails
- volume of CBDC transactions handled via hybrid infrastructure
- number of CBDC-based programmable services deployed
- number of CBDC-wallet integrations supported
- cross-border CBDC corridors activated

- CBDC fraud-prevention accuracy metrics
- interoperability latency (ms) between CBDC networks

The first 24–36 months of CBDC deployment will be a honeymoon period where adoption remains modest.
This is the opportunity for Visa and Mastercard to strengthen infrastructure, secure early partnerships, and develop programmable features without competitive pressure.

After the inflexion point (typically years 3–5 in simulations), CBDC volumes increase rapidly, and networks established as orchestration platforms will capture disproportionate long-term value.

11. Strategic Outlook: From Cards to Digital Money Infrastructure

The future of payments will not be shaped by who issues the card or who holds the CBDC.
It will be determined by who manages trust, interoperability, programmability, and global connectivity.

CBDCs reshape the money layer.
Visa and Mastercard can modify the structure surrounding the money layer.

In this roadmap, I outline a vision where the card networks evolve into:

- **gateways of global digital currency movement**,
- **hosts of programmable commercial logic**,
- **anchors of trust in sovereign-money ecosystems**,
- **interoperability platforms spanning nations**,
- **architects of merchant and consumer digital behaviour**,
- **intelligence engines of the world's financial flow**.

CBDC is not the end of the card networks.

It is the moment they stop being just card networks and become the digital operating systems for global value exchange.

Leveraging CBDC Behavioural Insights: A Strategic Opportunity for Visa & Mastercard

The CBDC Landscape – Threat or Strategic Opportunity?

Central Bank Digital Currencies (CBDCs) are quickly emerging across Europe and beyond, raising unavoidable questions for Visa and Mastercard. Will CBDCs displace traditional card networks, or can they act as a catalyst for growth? My analysis suggests that, if approached strategically, CBDCs are not a threat but a transformative opportunity for card networks to evolve their roles. The key is understanding consumer behaviour and finance, and employing data-driven modelling to develop a proactive strategy. In fact, research indicates that consumers' ingrained habits are the strongest predictors of future payment behaviour. Visa and Mastercard can utilise advanced behavioural modelling, agent-based simulations, fragility metrics, and adoption forecasts to anticipate these habits and turn CBDC into a new growth opportunity rather than a zero-sum competitor.

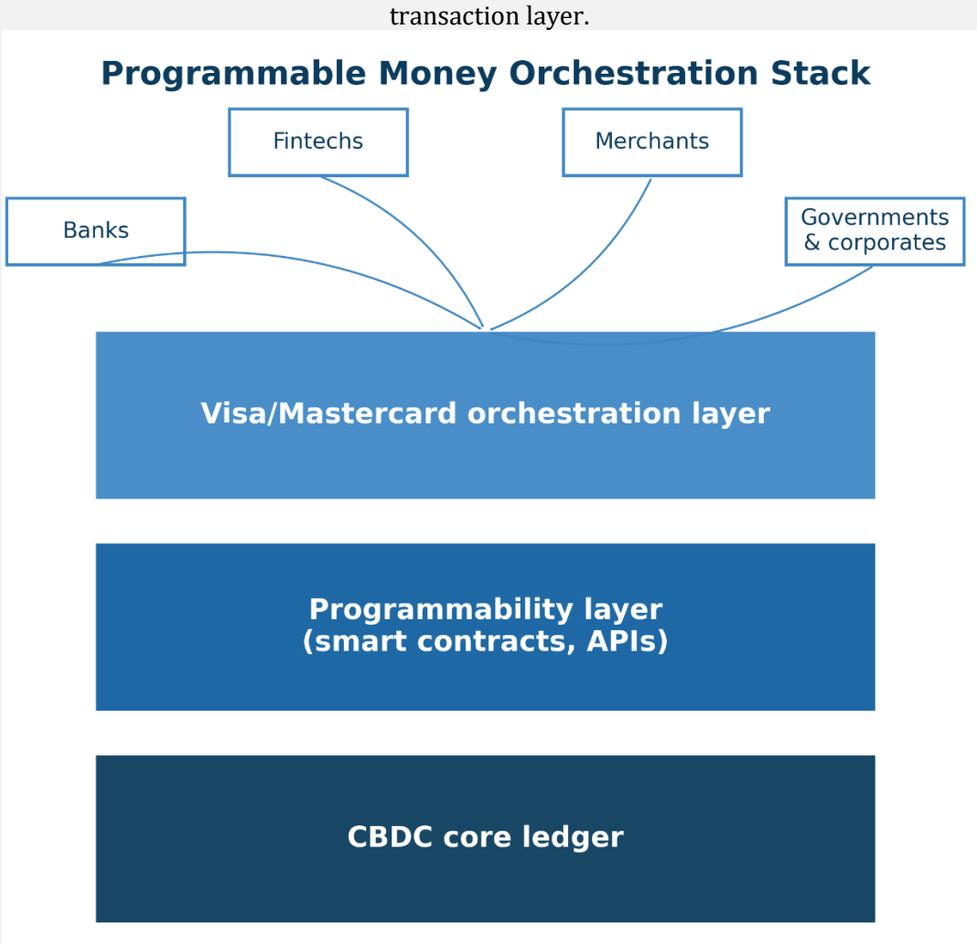
In the short term, CBDC pilots will be introduced gradually. Initial adoption is likely to be modest, creating a "honeymoon period" for incumbents to innovate without immediate pressure. This window is a strategic opportunity: Visa and Mastercard can develop new offerings, integrate CBDC infrastructure, and strengthen their network advantages before digital currency use increases. As with early mobile banking, CBDCs will "start small" – a fact that management can use to justify investing now in future capabilities.

Crucially, consumer behaviour divides the population into distinct adopter and holdout segments. Within the euro area, a clear divide exists between "cash-favouring" traditionalists and "digitally-favouring" enthusiasts, with most individuals loyal to a single dominant payment method. In other words, those inclined to adopt digital options (via cards or CBDC) will do so strongly, while others will prefer familiar methods. This insight is vital: Visa and Mastercard must identify, target, and serve each segment differently to succeed in a CBDC-enabled market. My framework's detailed behavioural data – covering trust levels, tech-savviness, and financial habits – enables precisely that.

Expanding Services in a CBDC-Enabled Market

Visa and Mastercard can expand their service offerings by integrating CBDCs into their current infrastructure and developing new solutions for consumers and enterprises. Instead of just processing card payments, the networks should position themselves as all-encompassing "payment utilities" for the digital currency age. Key opportunities include:

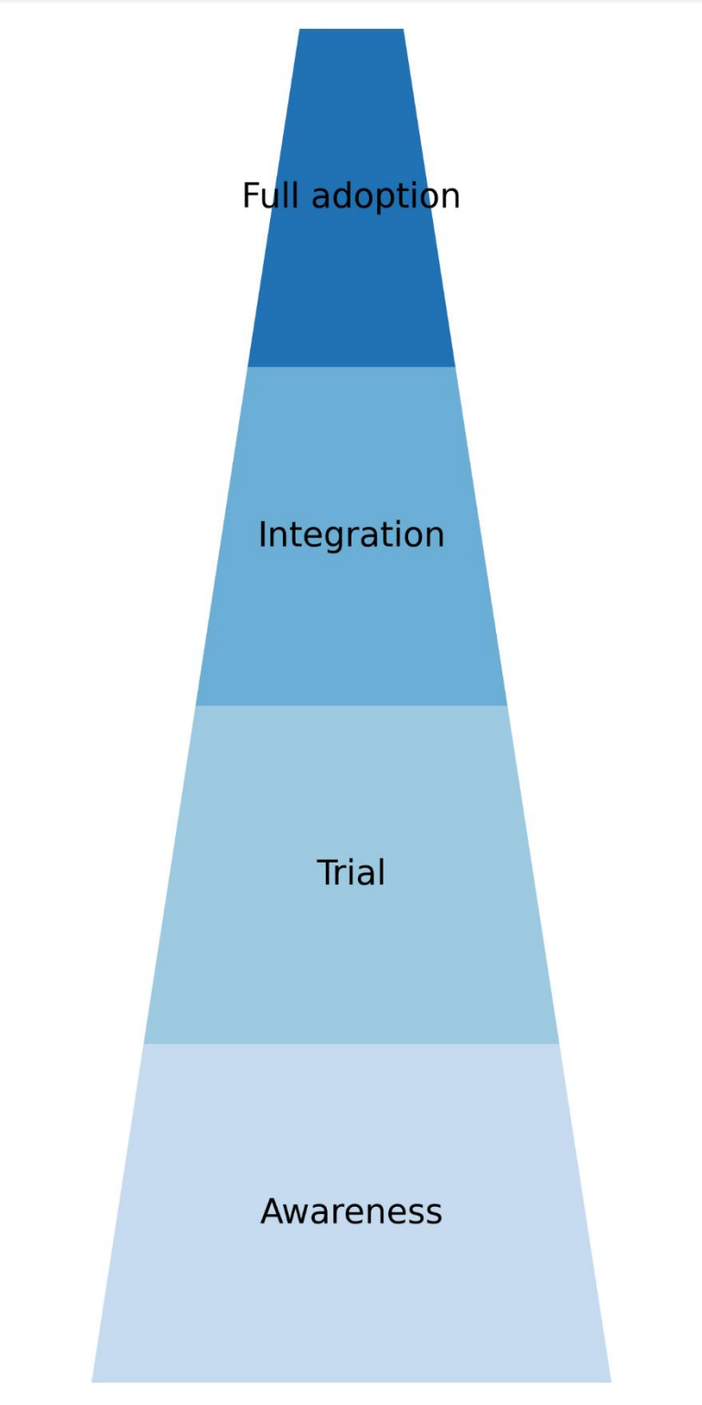
- **CBDC Wallet Integration & Payment APIs:** Offering interoperable digital wallet platforms and APIs that enable banks, fintechs, and even central banks to connect with Visa/Mastercard's network. This means any CBDC transaction (person-to-merchant, P2P, or cross-border) could be routed smoothly through familiar Visa/Mastercard channels, ensuring the networks remain central to the payments process. By supporting CBDC on their rails, card networks become infrastructure providers for the new currency, rather than competitors pushed aside by it.
- **Identity, Compliance & Trust Services:** Drawing on their broad fraud prevention and KYC expertise, Visa and Mastercard can provide digital identity verification and "trust scoring" for CBDC transactions. For instance, each CBDC wallet or transaction could be assigned a trust score by the card network, offering reassurance to merchants and consumers in a new, technology-driven ecosystem. This approach transforms an emerging challenge – how to establish trust in a sovereign digital currency – into a service opportunity for card networks. (My game-theoretic models highlight that maintaining consumer trust is crucial to preventing widespread shifts to CBDC. Visa and Mastercard can serve as the pillars of that trust.)
- **Value-Added Programmability:** Traditional card payments are primarily transactional, but CBDCs enable programmable money – including conditional payments, smart contracts, and automated financial logic. Card networks can build platforms that help businesses easily adopt these features. For example, Visa could offer a "programmable payment sandbox" where merchants set smart-contract rules (subscriptions, just-in-time insurance payments, escrow conditions, loyalty triggers) executed via CBDC but managed through Visa's infrastructure. Mastercard could create toolkits for governments or corporations to disburse funds with embedded rules (e.g., stimulus payments that expire if not spent). In this way, the networks broaden their services into the business logic layer of money, beyond just the transaction layer.



Programmable Money Orchestration Stack – a new conceptual diagram. Illustration: *A layered stack showing CBDC at the base (core ledger), above it a programmability layer (smart contracts, APIs), and on top a Visa/Mastercard orchestration layer that connects banks, fintechs, merchants, and consumers. This visual emphasises how card networks can sit atop CBDC infrastructure, orchestrating complex cross-border payment flows and innovative services.*

- **CBDC-Card Conversion & Treasury Services:** Develop services for instant conversion between CBDC and traditional money on cards. For example, a CBDC-to-card "auto top-up" feature could enable consumers to seamlessly recharge a prepaid Visa or Mastercard wallet using CBDC (or vice versa), making the use of either currency frictionless. This keeps

consumers within the card network's ecosystem even as they utilise CBDC. Additionally, Visa and Mastercard can provide treasury services to merchants and banks for managing CBDC liquidity, including tools to sweep excess CBDC (beyond holding limits) into other accounts and analytics on CBDC versus fiat sales. These services ensure business continuity for merchants and banks navigating a dual-currency system.



CBDC-to-Card Adoption Funnel – a customised chart illustrating a consumer journey. Illustration: *A funnel diagram with stages: Awareness (learning about CBDC), Trial (initial use of CBDC alongside cards), Integration (using CBDC via card network-enabled apps), and Full Adoption (regular CBDC use, facilitated by card network services). The funnel shows where Visa/Mastercard can engage consumers – for example, at the trial stage by offering user-friendly CBDC-linked cards or at the integration stage through incentives for linking CBDC to their card accounts – thereby guiding users through the funnel within their ecosystem.*

CBDC Adoption Funnel – Awareness → Full Adoption

The adoption funnel illustrates the behavioural journey individuals undertake as they transition from traditional money to CBDC-enabled payments. The five stages – Awareness, Trial, Integration, Full Adoption – reflect a consistent diffusion pattern aligned with consumer finance research.

For Visa and Mastercard, each phase outlines a commercial opportunity.

Awareness phase

Consumers understand what CBDC is, but have not yet started transacting with it.
→ Visa/Mastercard can establish themselves as trusted educators by including CBDC explainer modules in their apps, thereby enhancing brand trust early.

Trial phase

Consumers are trying to hold or spend CBDC for the first time.
→ Card networks can offer CBDC-linked cards or wallets, turning experimentation into a managed, on-network experience.

Integration phase

CBDC becomes part of consumers' regular financial routines, including P2P and bill payments.

→ Visa/Mastercard can develop hybrid products: CBDC auto-top-ups, programmable merchant rewards, CBDC-backed micro-lending.

Full adoption

CBDC is fully integrated into daily life.
→ Even here, Visa/Mastercard remain relevant by providing the risk, trust, dispute, and orchestration infrastructure on top of CBDC.

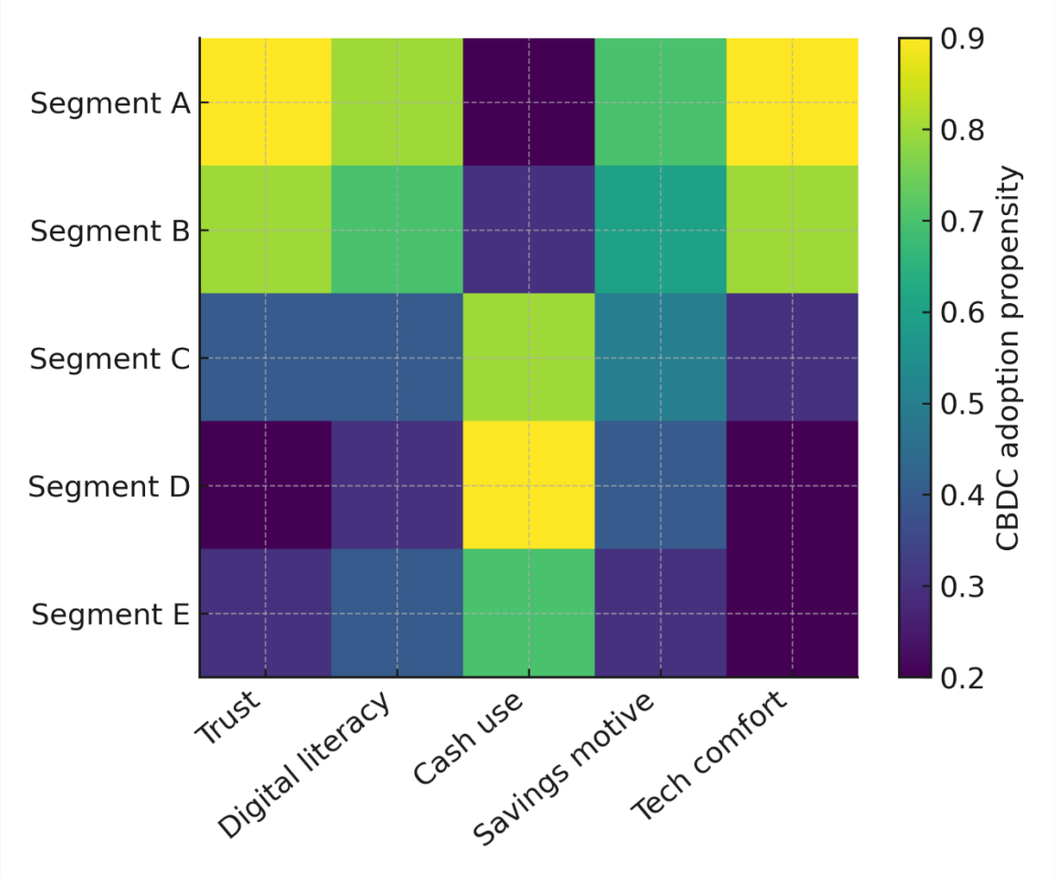
The funnel indicates that incumbents succeed by capturing the consumer journey early, establishing Visa/Mastercard as the default interfaces for CBDC use.

By expanding their offerings in these ways, Visa and Mastercard can boost transaction volume and customer touchpoints even as digital legal tender evolves. Importantly, they transition from solely transaction processors to platform enablers, ensuring that whether a customer pays in euros, lei, or digital euro, the networks facilitate and improve that payment.

Capturing Emerging Commercial Layers: Programmability, Trust & Cross-Border

CBDCs will establish new commercial tiers within the payments value chain. Visa and Mastercard are uniquely positioned to benefit from these, thanks to their global networks and technological expertise. Three key aspects stand out: programmability, trust & analytics, and cross-border interoperability.

- **Programmability & Smart Payments:** As noted, the ability to embed conditions in money opens new business models. Card networks can host marketplaces or libraries of innovative payment applications. Consider recurring payments today: Mastercard could develop this into a smart contract that dynamically adjusts (for example, a subscription fee that automatically reduces when a service is not used). By investing in this layer, the networks become guardians of payment innovation, offering templates, developer support, and a secure environment for programmable transactions at scale.
- **Trust, Data & Scoring Layer:** In a CBDC environment, a transparent, trust-based user experience will set services apart. Visa and Mastercard can develop a "trust scoring" service for CBDC transactions – similar to a credit score for payment behaviour – that helps merchants assess transaction risks (fraud, chargeback likelihood, etc.), even when payments are instant and irreversible in central bank money. They can also offer detailed analytics on consumer spending habits by integrating CBDC transaction data (with user consent and privacy safeguards). This not only opens new revenue streams, such as selling anonymised insights, but also establishes the networks as essential data platforms for the digital economy. My behavioural analysis framework can support these analyses by profiling consumer segments and behavioural triggers (e.g., identifying which Type A or B consumers are driving early CBDC adoption).



CBDC Behavioural Heatmap by Segment – a visual representation. Illustration: A matrix displaying consumer segments (A–E or similar personas) on one axis and various behavioural metrics on the other (trust level, digital literacy, cash usage, etc.). The cells are coloured to indicate the likelihood of CBDC adoption. This visual would show, for example, Type A (tech-savvy optimists) in bright colours, indicating a high probability of adoption, versus Type D/E (tech-shy or no-savings) in cooler colours, indicating a low likelihood of adoption. Visa/Mastercard can use these insights to identify which segments to target for new CBDC-linked services.

- *Type A - Tech-savvy individuals who store money and are digitally financially included, with the capacity to cope with adverse financial developments.*
- *Type B - Tech-savvy individuals who store money and are digitally financially included, but cannot cope with adverse financial developments.*
- *Type C - Unbanked individuals (those without a bank account).*
- *Type D1 – Individuals storing money – non-tech-savvy (with no history of digital payments or money transfers) – able to handle adverse financial developments.*
- *Type D2 – Individuals storing money – not tech-savvy (with no history of digital payments or money transfers) – unable to manage adverse financial situations.*
- *Type E – Banked individuals who have no stored money.*

Behavioural Heatmap – Segment A–E CBDC Propensity

This heatmap visualises the probability of CBDC adoption across consumer groups characterised by trust, digital literacy, cash use, savings motivations, and technological comfort.

Visa/Mastercard can use these insights to:

Target the strongest adopters (Segments A & B)

These consumers should be offered:

- CBDC-ready wallets
- Early-access pilots
- Programmable loyalty features

They become “CBDC champions” using Visa/MC infrastructure.

Manage risk among cash-heavy or tech-shy consumers (Segments C–E)

These groups need:

- simplified interfaces
- optionality between CBDC and traditional money
- high-trust messaging
- assisted onboarding

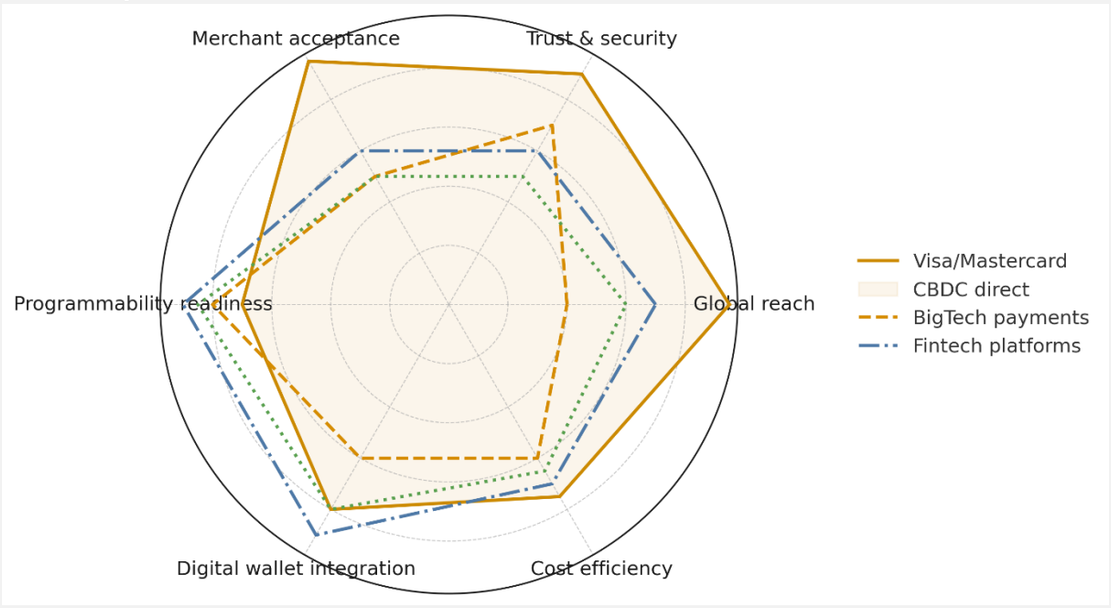
This ensures no erosion of market share as CBDC adoption expands.

Design differentiated products

- Segment A/B → features and programmability
- Segment C → financial inclusion bundles
- Segment D/E → risk-free, guided CBDC use via Visa/MC rails

This heatmap essentially acts as a market segmentation blueprint for Visa and Mastercard's CBDC strategy.

- **Cross-Border CBDC Routing:** Perhaps the most immediate advantage that card networks possess is their global reach and cross-currency expertise. When each country issues its own CBDC, interoperability becomes a complex technical and legal challenge – one that Visa and Mastercard are well-equipped to address. They can offer a "universal translator" service for CBDCs, enabling, for example, a digital euro payment to be seamlessly converted into a digital leu or a digital dollar, with compliance and FX managed in between. This could function much like today's card transactions, where a Romanian cardholder pays abroad, and Visa or Mastercard handles currency conversion and settlement. By positioning themselves as the cross-border backbone for CBDC, the networks ensure they capture fees and data on international transactions that might otherwise bypass banks entirely. Furthermore, facilitating cross-border retail CBDC use will accelerate network effects, making each CBDC more useful – and establishing the card network at the centre of that utility.



Competitive Displacement Radar – Payment Networks. Illustration: A radar chart comparing traditional card networks with emerging alternatives such as CBDC direct use, BigTech payment platforms, and fintechs across key competencies: global interoperability, trust/security, programmability, user base, merchant acceptance, etc. Visa/Mastercard show firm peaks in worldwide reach and trust, while, for example, a national CBDC might excel in domestic settlement speed but have limited cross-border capability. This visual highlights where card networks can leverage their strengths (e.g., cross-border) to fill gaps that CBDCs or other alternatives cannot, thereby capturing those layers.

In capturing these new layers, Visa and Mastercard transition from being solely card companies to becoming networked platforms for programmable, trusted, cross-border digital value exchange. They essentially future-proof their roles in an era where money itself is software. This allows management to reassure stakeholders that the networks' growth will stem not just from more card swipes, but from enabling the new "commercial stack" of CBDC-based services.

The competitive radar compares Visa and Mastercard against three emerging forces in the retail payments ecosystem: direct CBDC use, BigTech payment platforms, and fintech challengers. Across the six strategic axes – global reach, trust & security, merchant acceptance, programmability readiness, digital-wallet integration, and cost efficiency – traditional card networks maintain structural advantages, especially in trust, cross-border interoperability, and merchant penetration. These capabilities are complex for new entrants to replicate quickly.

CBDCs demonstrate strong potential in programmability and long-term cost efficiency. Still, they lack the commercial distribution channels, merchant networks, and global technological infrastructure that Visa and Mastercard already have in place. BigTech firms excel in integration and programmability but fall short on regulatory trust. Fintechs innovate quickly yet remain small-scale and rely heavily on the infrastructure and licensing frameworks of established incumbents.

For Visa and Mastercard, this visual shows that the correct strategic stance is expansionary, not defensive. The introduction of a CBDC does not negate their advantages; instead, it shifts the battlefield towards areas where it can secure a decisive win.

- providing **global interoperability services** for domestic CBDCs;
- offering **programmability toolkits** and smart-contract orchestration for merchants;
- embedding **wallet infrastructure**, identity verification, and fraud screening directly into CBDC rails.

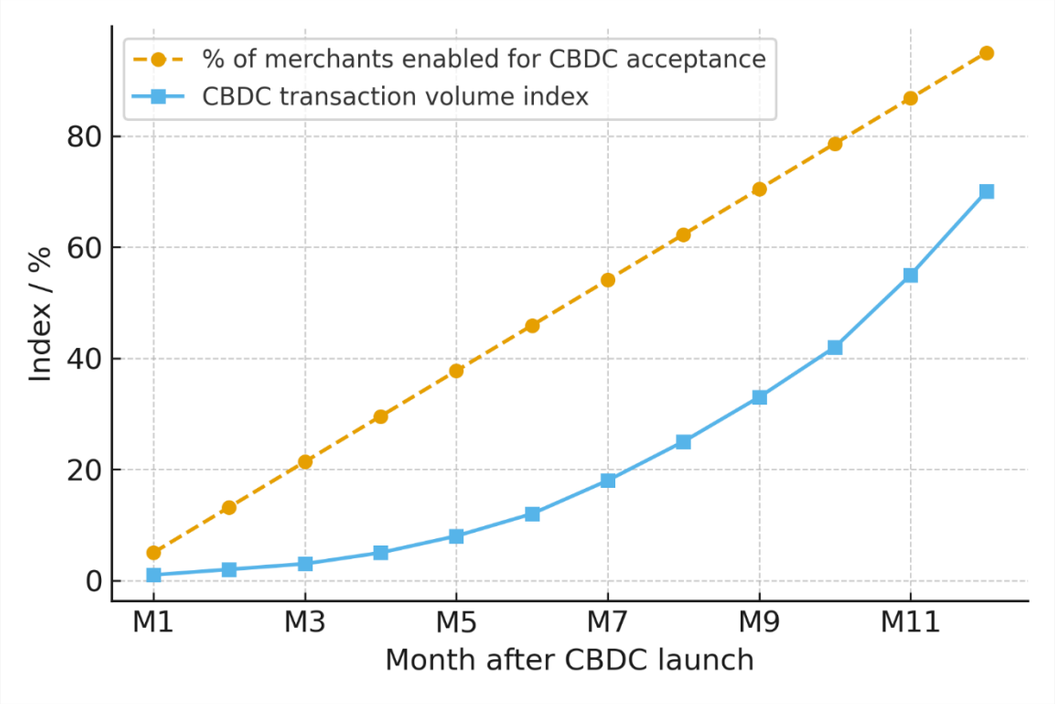
CBDC diminishes the importance of simple transaction processing, but it increases the value of intelligent orchestration, where Visa and Mastercard already excel. This indicates that their competitive advantage remains, as long as they evolve from card processors into payment and programmability platforms.

Retaining Merchant Dominance and Network Effects in a CBDC Ecosystem

Visa and Mastercard's dominance has always depended on the two-sided network connecting many consumers and numerous merchants. CBDCs introduce a scenario in which, in theory, consumers could pay merchants directly with central bank money – potentially bypassing card networks. However, in practice, merchants value integrated solutions, customer reach, and added-value services. Card networks can therefore maintain (and even strengthen) merchant relationships by being the most straightforward, most beneficial route for merchants to accept CBDC payments.

Strategies to achieve this include:

- **Unified Acceptance Platforms:** Ensure that point-of-sale systems and e-commerce gateways provided by Visa/Mastercard (or their acquirers) accept CBDC as seamlessly as they accept cards. For a merchant, there should be little difference – the same terminal or API, provided by the card network, processes a CBDC payment alongside card payments. This integrated approach means merchants have no incentive to seek alternative providers for CBDC transactions. By owning the merchant interface for CBDC, Visa/Mastercard keep merchants within their network even as payment methods diversify.
- **Merchant Incentives & Loyalty:** My behavioural models show that incentives for merchants are a powerful way to encourage adoption. Card networks could offer special incentives to merchants for CBDC transactions routed through their systems – such as reduced fees (or central bank subsidised zero fees) combined with comprehensive loyalty data. They might enable merchants to operate integrated loyalty programmes that reward customers for using either CBDC or cards on the network. By serving as channels for these incentives, Visa and Mastercard both motivate merchants to prefer their platforms and ensure that increased CBDC usage benefits the networks through data collection, upselling, and analytics.
- **Network Effects & Merchant Advocacy:** Visa and Mastercard can leverage their existing scale to promote CBDC acceptance more quickly than a new entrant could. For instance, they could launch a Europe-wide campaign for all merchants in their network, demonstrating how to accept the digital euro through their existing accounts, effectively switching on acceptance for hundreds of thousands of merchants. This proactive strategy would ensure that, once consumers begin holding CBDC, it becomes widely accepted, with Visa/Mastercard facilitating this process. Research suggests that once essential services and merchants adopt digital methods, consumer acceptance tends to follow naturally. By leading merchant onboarding, card networks generate the network effects that make a CBDC valuable, securing their central position in the resulting ecosystem.



Merchant Onboarding KPI Dashboard (Hybrid Adoption). Illustration: A sample dashboard showing KPIs in a scenario where both cards and CBDC are used. Metrics might include: % of merchants accepting CBDC (target: 100%), number of CBDC transactions processed via Visa/MC infrastructure, merchant satisfaction scores, and related metrics. A chart could compare merchant transaction volumes on card versus CBDC over a card network, demonstrating a growing total volume. This visual helps management monitor key aspects of CBDC deployment as it progresses – highlighting that high merchant acceptance and activity across their network are vital to maintaining dominance.

- **Preserving Fee Economics through Value-Add:** Although a CBDC might be free of charge at the central bank level, card networks can justify their fees by bundling additional services with transactions. For example, instant currency conversion, fraud protection, chargeback management, and financing options (such as buy now, pay later for CBDC purchases) can be added to CBDC payments to maintain a viable revenue stream. The message to merchants is that even if the payment method differs (CBDC versus card), the network's value – such as global reach, security, and service – remains essential. Therefore, Visa and Mastercard continue to hold pricing power and relevance.

Merchant Onboarding KPI Dashboard – Hybrid Adoption Dynamics

This dashboard tracks the proportion of merchants accepting CBDC over the initial 12 months and the corresponding increase in CBDC transaction volume. The insight is crucial: merchant acceptance influences consumer adoption, not the other way around.

Three strategic conclusions emerge:

1. **Card networks can accelerate CBDC usage by flipping a switch.**
   If Visa or Mastercard enable CBDC acceptance through existing terminals and APIs, adoption becomes seamless for millions of merchants overnight.
2. **Visa/Mastercard can remain the dominant checkout layer.**
   If merchants accept CBDC via Visa/MC networks, CBDC transactions become part of their turnover rather than competing with them.
3. **The transaction-volume index shows a "J-curve"**, signalling increasing commercial value. Visa and Mastercard can monetise CBDC-related services, including analytics, identity, FX, programmability, and settlement guarantees.

This chart confirms that the merchant strategy influences CBDC success, and Visa/Mastercard can position itself as essential to that success.

Fundamentally, maintaining merchant dominance in a CBDC world involves leveraging existing network effects to integrate CBDC. The more networks act as the bridge between CBDC and the commercial marketplace, the more they ensure that each new CBDC user genuinely enhances the network's reach rather than bypassing it. With millions of merchant touchpoints as potential CBDC on-ramps, Visa and Mastercard can turn the threat of disintermediation into an opportunity to broaden their network effect.

Data-Driven Consumer Behaviour Insights Guiding Strategy

All the strategies mentioned above should be grounded in evidence. My CBDC behavioural modelling framework offers detailed, predictive insights into consumer and merchant behaviour that Visa and Mastercard management can utilise to inform decisions on expansion, development priorities, and interoperability planning. Key analytical tools and their real-world applications include:

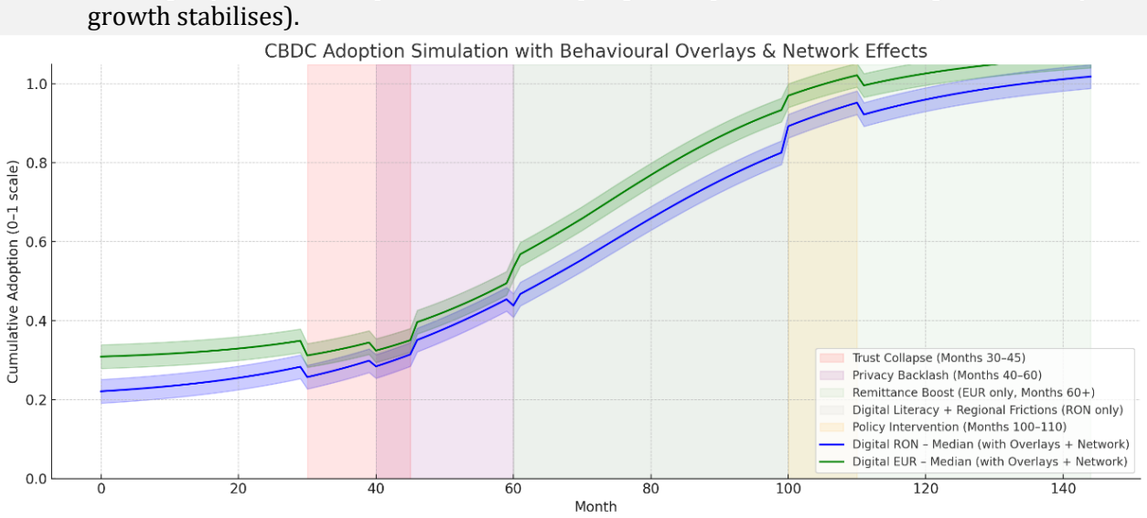
Behavioural Segmentation (Types A–E): The framework identifies specific consumer groups (A–E) with different tendencies to adopt CBDC, based on factors such as digital habits, trust in institutions, and financial resilience. For Visa/MC, this segmentation acts as a guide for targeted strategies:

- *Types A & B (Digitally savvy savers)* – Likely early CBDC adopters; these customers could be invited to pilot programmes linking CBDC with their existing cards, turning them into ambassadors for new services.
- *Type C (Unbanked individuals)* – This group could jump directly to CBDC via mobile wallets. Visa/MC can develop inclusion programmes or simple onboarding methods to bring these users into the formal network (e.g., by offering a free digital Visa card linked to a CBDC wallet).
- *Types D & E (Tech-shy or no savings)* – These are late adopters who may not initially see the value in CBDC. The networks can plan educational campaigns and simple-to-use products later, once the ecosystem is mature, to bring these holdouts on board gradually. Knowing they are slower to adopt allows resources to be allocated elsewhere first.

By tailoring product development and marketing to each behavioural segment, Visa and Mastercard maximise adoption of their CBDC-related services. They avoid a one-size-fits-all approach and instead use behavioural data to guide decisions.

Adoption Simulation & Forecasting: My agent-based simulations project how CBDC adoption might grow from 2025 to 2037 under different scenarios, including network effects and behavioural feedback loops. The findings are insightful for strategic planning:

- **Gradual Adoption, then Rapid Growth:** Early years show modest uptake – a crucial period where incumbents can experiment and develop capacity without losing significant market share. By 2033, however, the leading consumer groups (e.g., young digital natives, high-trust professionals) could reach 75–80% adoption. This indicates that Visa/Mastercard need scalable solutions ready when adoption accelerates to handle potentially millions of CBDC transactions.
- **Network Effects Kicking In:** The simulation indicates that as CBDC becomes more common, especially once salaries, public services, and many merchants start paying or accepting it, adoption accelerates naturally. For management, this means preparing infrastructure for sudden volume increases. My forecast chart (2025–2037) can guide capacity planning, ensuring network bandwidth, customer support, and technology are scaled in advance to avoid the risks of unpreparedness for rapid growth.
- **Plateaus and Saturation:** Interestingly, the models demonstrate that after a certain point, adoption plateaus as it nears saturation, with peer effects diminishing. This suggests the race will be won within the first decade: those who adopt early and secure access to the CBDC flow will establish their position. Visa and Mastercard can use these insights to plan investment timelines (e.g., aiming for full CBDC interoperability and broad merchant coverage by the time adoption enters its rapid growth phase, then focusing on efficiency as growth stabilises).



CBDC Adoption Dynamics (2025–2037): Behavioural Overlays, Shocks, and Network Effects. The CBDC adoption simulation illustrates a structured, multi-phase diffusion process, with behavioural shocks and trust dynamics influencing the adoption curve. Rather than a smooth penetration trajectory, the model reveals distinct behavioural regimes – each tied to real-world psychological thresholds and external events. Both Digital RON and Digital EUR adoption paths are similar in shape, although EUR adoption is consistently slightly higher due to remittance effects and euro-preference patterns.

In the final light-green phase, both curves show a slight softening as the diffusion process becomes increasingly saturated. No new behavioural shocks occur here; instead, peer effects strengthen, marginal adopters become harder to convert, and adoption momentum naturally recalibrates before rising again. This phase marks the transition from shock-sensitive behaviour to a more stable, network-driven settling pattern as the system approaches its long-run saturation levels.

Phase 1: Early Exploration (Months 0–30)

Adoption remains relatively modest in the early years, with gradual growth as awareness increases and digitally confident users test CBDCs. During this phase, Visa and Mastercard may find that CBDC adds to digital traffic rather than replacing existing methods. The slow initial progress creates an opportunity for networks to smoothly integrate CBDC into existing wallets, authentication processes, and checkout systems.

Phase 2: Stress Sensitivity & Trust Events (Months 30–60)

The simulation incorporates two behavioural shocks:

- **Trust Collapse (Months 30–45)**
  A temporary decline in trust leads to a visible slowdown in adoption, highlighting how delicate early sentiment can be.
- **Privacy Backlash (Months 40–60)**
  Concerns about data visibility and potential CBDC misuse further delay progress.

These shocks show that early CBDC ecosystems are at risk from narrative dangers. For Visa/Mastercard, this stresses the need to include trust messaging, transparency, and consumer protection in all CBDC-related products. Their brand reputation acts as a stabilising force that offsets volatility.

Phase 3: Positive Behavioural Reinforcement (Months 60+)

After Month 60, adoption accelerates sharply due to:

- **Remittance Boost (EUR only, reflecting diaspora payment flows and euro-preference)**
- **Digital Literacy & Regional Frictions (RON only, slowing but not preventing uptake)**

These behavioural drivers illustrate how CBDC adoption becomes self-reinforcing as real-world usage cases emerge. This is when Visa/Mastercard might position themselves as facilitators of programmability, offering incentives, loyalty schemes, and integrated smart-payment tools.

Phase 4: Policy Intervention & Network Effects (Months 100–110)

A simulated policy intervention – such as merchant subsidies, enhanced offline functionality, or streamlined onboarding – results in a noticeable stepwise increase in adoption for both currencies.

This intervention marks the moment when CBDC shifts from an early-adopter product to a mainstream digital payment method, and when network effects take over the final stage of the curve. Visa and Mastercard can play a vital role here by:

- enabling **instant merchant acceptance** of CBDC through existing rails,
- providing **risk management services**,
- integrating **programmability toolkits** into merchant-facing APIs.

Phase 5: Maturity & Saturation (Months 110–140+)

The final stage depicts a saturation point, with adoption stabilising near the upper end of the scale. At this point, CBDC becomes a standard digital tool integrated into the broader financial system.

Here, Visa and Mastercard's roles shift from onboarding and orchestration to becoming long-term infrastructure partners, offering cross-border routing, programmable payment logic, trust scoring, dispute systems, and merchant intelligence.

Fragility Metrics & Trust Dynamics: Implications for Visa/Mastercard

The behavioural overlays correspond directly with the fragility models developed within the broader framework.

1. Trust as the Primary Determinant of Systemic Behaviour

The dips during the Trust Collapse and Privacy Backlash periods illustrate the non-linear effect of sentiment: small shocks lead to disproportionately large behavioural shifts.
In game-theoretic terms, users switch between two equilibria.

- **Stay with deposits**, or
- **Shift to CBDC**.

Trust determines which equilibrium dominates.

Relevance to Visa/Mastercard:

Their global reputation and consumer familiarity enable them to act as stabilisers in fragile environments. When trust in CBDC varies, trust in Visa/Mastercard serves as a behavioural anchor. CBDC integrated through Visa/Mastercard becomes a confidence-maintaining channel.

2. Systemic Stability Through Design & Policy Signals

The model emphasises that tiered holding limits, non-remuneration of CBDC, and predictable policy rules significantly decrease disintermediation risk.
The adoption curve becomes smoother as these rules anchor expectations.

Relevance to Visa/Mastercard:

Networks may provide technical enforcement or monitoring of such policy safeguards within their infrastructure. Their systems can act as policy transmission mechanisms, ensuring that CBDC remains a payment medium rather than a threat to the store of value.

3. Real-Time Monitoring & Early Warning Systems

The behavioural dips and recoveries highlight why real-time trust indicators, such as:

- **Confidence Erosion Index**,
- **Conversion Risk Threshold**,
- **CBDC Outflow Velocity**,

They are vital to detecting systemic risk.

Relevance to Visa/Mastercard:

Networks can incorporate early-warning dashboards into their internal monitoring systems. Any unexpected surge in CBDC usage via Visa/Mastercard rails may indicate:

- emerging liquidity stress,
- narrative contagion,
- behavioural tipping points.

By detecting this early, they can coordinate with regulators to stabilise the ecosystem – reinforcing their value as macro-financial guardians.

Final Strategic Interpretation for Visa/Mastercard

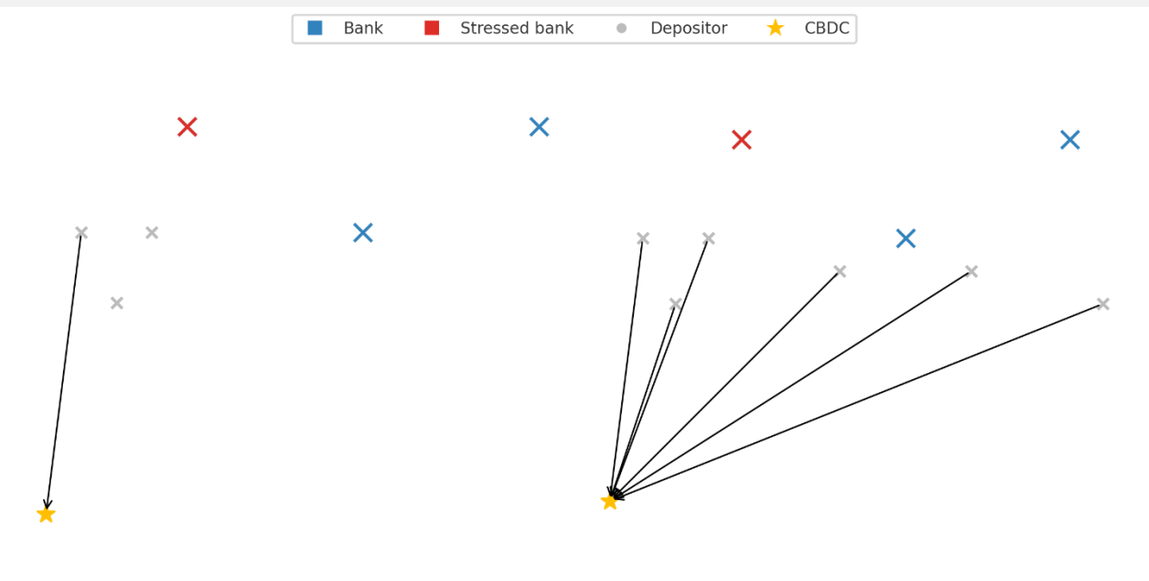
This adoption simulation confirms three overarching insights:

1. **CBDC adoption is behavioural, not mechanical.**
   Trust, narratives, and merchant acceptance influence the curve more than technology.
2. **Visa/Mastercard can materially influence every behavioural phase.**
   Through design choices, trust reinforcement, programmability, merchant tools, and real-time monitoring.
3. **The most significant commercial opportunities arise after Month 60**, when programmability, incentives, cross-border flows, and network effects drive demand more rapidly.

The attached visual is therefore not just a forecast – it is a map of where Visa/Mastercard can add value at scale, turning CBDC from a theoretical threat into the next primary growth driver in global payments.

Trust-Shock Propagation Simulator. Illustration: A schematic of a network graph showing bank nodes and consumer nodes, where a shock (for example, a sudden loss of trust in a bank) spreads, with arrows indicating consumers moving funds to CBDC. The simulator visual could display two scenarios side by side – one with strong safeguards or trust (causing minimal propagation) and one without (leading to rapid cascade). This helps Visa/Mastercard management understand the vital role trust plays and how their efforts in providing stability – through guarantees, messaging, or technical limits – can reduce such shocks.

- *Fragility Metrics & Trust Dynamics*: Beyond adoption rates, maintaining system stability and trust remains crucial. My framework includes fragility metrics (e.g., a Trust Volatility Multiplier) and game-theoretic models that assess how trust shocks can trigger deposit flight or CBDC runs. One model highlights a coordination issue: there are two equilibria – either most depositors stay with banks or most switch to CBDC – and the prevailing outcome depends on collective trust. For card networks, this underscores the need to strengthen trust across multiple levels.
- *Trust in the network:* Visa and Mastercard should strengthen their reputation for security and reliability so that consumers and merchants feel more confident transacting through the network (even with CBDC) than off-network. Any public concerns that "CBDC might make cards obsolete" must be addressed with messages of complementarity and partnership.
- *Systemic stability:* The models show that clear policies, such as tiered CBDC holding limits and non-remuneration, substantially reduce disintermediation risk. Visa and Mastercard can promote and support the implementation of these safeguards, for example, by configuring their systems to enforce holding limits or by providing data to central banks on usage to inform policy adjustments. By actively engaging in policy development, they reduce the likelihood of a disruptive shock that could harm all parties.
- *Real-time monitoring:* My game-theoretic approach recommends using real-time behavioural indicators, such as a Confidence Erosion Index, to detect early signs of panic or rapid market shifts. Visa and Mastercard can incorporate this into their risk dashboards – for instance, by monitoring unusual increases in CBDC transaction volumes that could signal a bank run. Early warnings enable coordinated responses with regulators to stabilise the system. In essence, the networks can serve as the eyes and ears of the financial system's behavioural health.



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Left panel – "Strong safeguards (minimal propagation)"

- A stressed bank (red marker)

- A few nearby depositors (grey)
- Only **one arrow** flows into the CBDC node (yellow star)
- Other banks (blue) and depositors remain unaffected

Right panel – "No safeguards (cascading run)"

- Same stressed bank (red)
- Many depositors across the system (grey)
- **Multiple arrows** flowing into CBDC from many directions
- Other banks (blue) are bypassed as depositors flee to CBDC

A common legend at the top clarifies: **Bank, Stressed bank, Depositor, CBDC**.

Detailed Explanation & How This Helps Visa/Mastercard

1. What the simulator represents

This visual translates the **game-theoretic trust models** into a picture that management can interpret intuitively:

- Each grey dot is a **depositor**.
- Each blue mark is a **commercial bank**.
- The red mark is a **stressed bank** facing a credibility shock (rumours, bad news, liquidity issues).
- The yellow star is the **CBDC exit option** – a frictionless, risk-free alternative backed by the central bank.

The left side shows a world where **safeguards and trust are strong**:

- Clear holding limits
- Transparent communication
- Backstops
- Possibly tiered remuneration and close coordination with networks

Here, most depositors keep calm and **stay with banks**; CBDC inflows are limited.

The right side shows a world **without safeguards**:

- No clear rules
- No credible communication
- Perception that CBDC is "safer" and unconstrained

The same shock now triggers **contagion**: many depositors across several banks simultaneously exit into CBDC, bypassing the intermediation layer.

This is the digital equivalent of a **coordinated bank run** – faster and more severe because CBDC flows are instantaneous.

2. Why this matters for Visa & Mastercard

From a card-network perspective, the diagram highlights three critical points:

a) CBDC can become a *run accelerator* – or a *stability valve*

If unmanaged, CBDC can serve as a highly efficient bank-run **channel** (right panel).
If well-designed and supported, it can instead act as a **targeted safety valve** (left panel) – absorbing localised stress without destabilising the entire system.

Visa and Mastercard have an interest in the second outcome because they rely on:

- a functioning banking system (issuers, acquirers), and
- stable consumer confidence in digital money.

b) Networks can dampen propagation through *design and messaging*

Visa/Mastercard sit in the **transaction path** between depositors, merchants, and potentially CBDC wallets. That position allows them to:

- apply **transaction throttles or warnings** in extreme episodes (subject to policy),
- distribute **trusted communications** (e.g., "funds remain safe; limits are in place; systems are monitored"),
- provide the interface for **orderly migration** rather than chaotic flight.

In the left panel world, this kind of orchestration helps keep arrows few and local.
In the right-panel world, where such architecture does not exist, every grey node runs the CBDC star simultaneously.

c) Their rail data can act as an *early warning sensor*

Because Visa/Mastercard can see **spikes in CBDC flows** and card-to-CBDC conversions in real time, they can function as **sensors** for trust erosion:

- A sudden cluster of CBDC top-ups from one issuer bank
- An unusual concentration of cash-out patterns in one region
- Rapid changes in spend vs. cash-out ratios

All those patterns correspond to the arrows in the right panel.
If networks surface these signals to central banks and supervisors early, the system can:

- respond with **targeted communication**,
- activate **liquidity backstops**,
- adjust technical parameters (e.g., temporary flow caps),
  Before a local shock becomes a system-wide run.

3. How Visa/Mastercard can use this internally

Management can use this visual as:

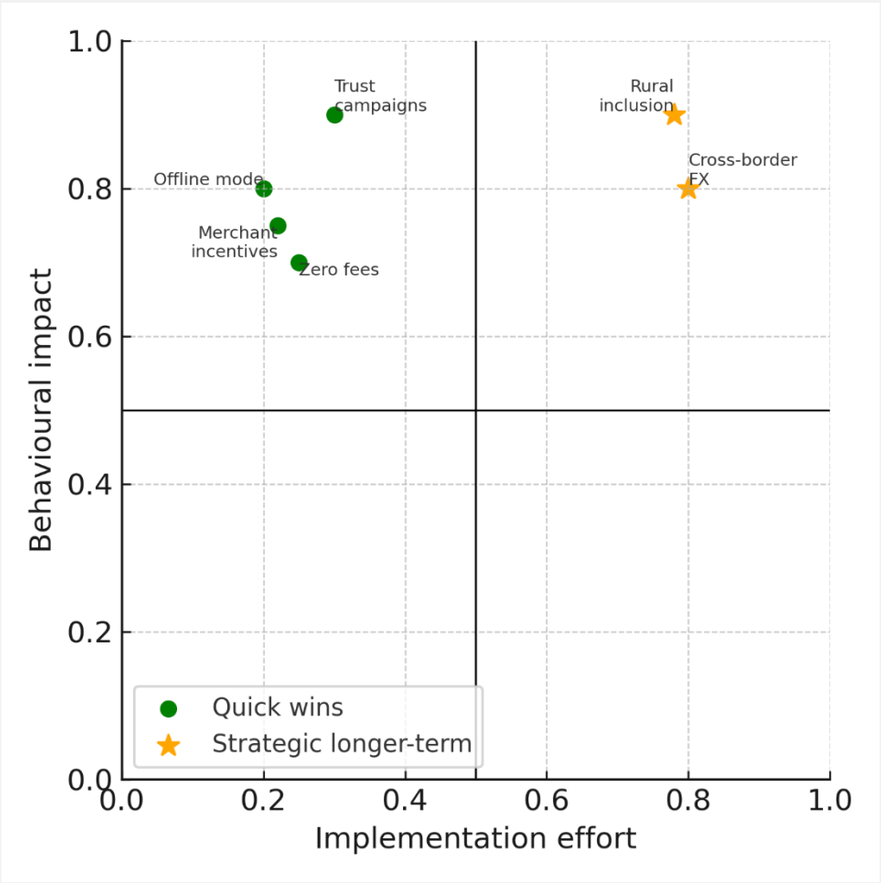
- A **board-level explainer** of why CBDC + trust issues ≠ linear risk, but **non-linear, networked risk**
- A tool in **regulatory dialogues** to argue for:
  - clear holding limits,
  - phased rollouts,
  - shared real-time monitoring frameworks
- A guide for **product design**:
  - building "soft brakes" for extreme scenarios,
  - integrating risk-communication modules into wallets and apps,
  - ensuring CBDC interfaces remain **orderly, not panic-driven**.

In other words, the simulator indicates that trust shocks are not solely related to banks and central banks – payment networks are part of the propagation process and can therefore also contribute to stabilisation.

Policy Prioritisation & Design Insights: Finally, my analysis produces a Policy Prioritisation Matrix that ranks CBDC design and policy features by their impact on user adoption relative to implementation difficulty. Notably, features such as offline functionality and zero fees rank as top priorities (high impact, low cost), alongside trust-building campaigns and merchant incentives. Meanwhile, more complex objectives, like cross-border integration or deep rural inclusion, while significant, are considered medium- to long-term. Visa and Mastercard can utilise this ranking to align their development roadmap with what most influences consumer behaviour:

- For example, **offline payment capability**: If the central bank hasn't perfected it, the networks might step in with solutions, such as cards that can store some CBDC value for offline use, since it significantly impacts user adoption.

- **Fee-free small transactions**: the networks might need to adjust their own fee structures, possibly subsidised by central banks initially, to ensure that using CBDC through their rails is as appealing as cash for small payments – knowing this can lead to significant adoption benefits.
- **Trust campaigns**: Visa/MC can collaborate with central banks on public education and trust messaging, emphasising that using a CBDC through Visa or Mastercard is safe and endorsed. This joint effort can speed up adoption in a way that benefits all parties.
- **Phased approach for complex features**: Recognising that cross-border CBDC use is complex, networks can plan these offerings over a longer timeframe, initially focusing on domestic interoperability and high-impact features that attract users, then progressively expanding. This phased approach reflects my matrix's advice to achieve quick wins now and address more complex tasks later, gradually.



Policy, Prioritisation Matrix. Illustration: A 2x2 matrix with axes "Behavioural Impact" versus "Implementation Effort". Key items (e.g., Offline Mode, No Fees, Trust Communications, Merchant Incentives) appear in the high-impact/low-effort quadrant (top-left) and are highlighted for immediate action. Items such as Cross-Border FX and Rural Inclusion fall in the high-impact/high-effort (top-right) quadrant, indicating longer-term projects. This visual helps Visa/Mastercard prioritise which capabilities to develop or lobby for first to support CBDC adoption in line with consumer needs.

Policy Prioritisation Matrix – High Impact vs. Low Effort CBDC Features

This matrix captures how different CBDC features influence user adoption relative to their implementation difficulty.

Quadrant analysis reveals:

Top-left (high impact, low effort):

- **Offline mode**
- **Zero fees**
- **Trust campaigns**
- **Merchant incentives**

These are quick wins that dramatically shift consumer behaviour.

Visa/Mastercard can leverage this insight to pressure regulators and central banks to prioritise these features – and can also offer some of them (e.g., merchant incentives, trust messaging). This

enhances their influence over the ecosystem's development, safeguarding their role during the CBDC rollout.

Top-right (high impact, high effort):

- **Cross-border FX**
- **Rural financial inclusion**

These are areas where central banks struggle – and where Visa and Mastercard excel. They already operate a global FX infrastructure and possess digital-inclusion expertise. Therefore, they can offer interoperability and inclusion services to governments and banks, securing a key role in the CBDC ecosystem.

This matrix indicates where Visa/Mastercard should invest, partner, and take the lead.

In summary, by leveraging these data-driven insights, Visa Europe and Mastercard can provide clear evidence to inform their management and stakeholders: projections of how large the CBDC user base might grow and when, which consumer groups to target, which product features will be most important, and how to mitigate risks. This shifts CBDC from a vague disruptor to a strategically managed business opportunity, supported by the same thorough analysis that central banks employ.

Conclusion: CBDC as a Driver of Growth for Card Networks

Far from spelling doom, the advent of Central Bank Digital Currency can be a scalable business opportunity for Visa and Mastercard. By expanding service offerings to integrate CBDCs, capturing new layers of value (programmability, trust services, cross-border flows), and doubling down on merchant network effects, card networks can position themselves as the indispensable infrastructure of the future digital economy. In this vision, CBDC is not a competitor taking a slice of the pie – it grows the pie, with Visa and Mastercard providing the ovens, the recipe, and the trusted kitchen to bake it in.

The insight from my CBDC behavioural modelling and simulations is clear: success will go to those who understand consumer behaviour and build accordingly. Visa Europe and Mastercard have decades of experience understanding how people spend, transfer, and trust money. Now, with my advanced agent-based models and fragility metrics, they can anticipate the future of this new digital money landscape. CBDC is simply money evolving – and Visa/Mastercard can grow with it, ensuring that as money becomes programmable, instant, and borderless, their networks do the same.

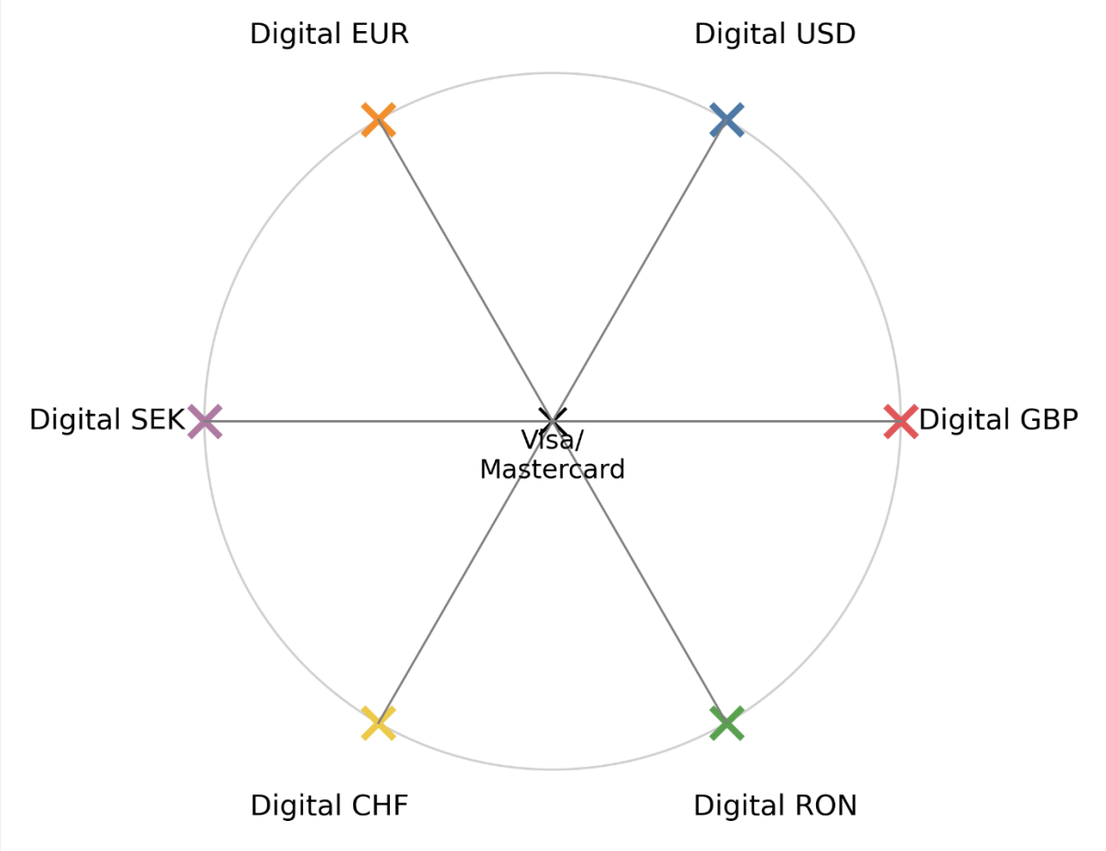
In practical terms, this means informing leadership and boards that:

- The timeline for CBDC adoption provides a manageable window to invest in new capabilities (with initial slow uptake and significant growth by the end of the decade).

- Strategic investment in consumer-focused features – such as seamless user experience, security, offline usage, and incentives – will generate disproportionate gains in adoption. - Collaboration with central banks and policymakers is not merely goodwill; it's a strategic move. By helping shape CBDC design (through technical input or pilot collaborations), card networks ensure the emerging system enhances rather than diminishes their strengths (for example, designing CBDC with limits and non-remuneration so it remains a payment medium, not a high-yield asset).

- Network resilience and trust remain crucial: with data tools to monitor behavioural shifts and a brand that signifies safety, Visa and Mastercard can act as stabilisers during times of change, a role that governments and users alike will greatly value.

Ultimately, Visa Europe and Mastercard can reassure their stakeholders that they will remain as relevant tomorrow as they are today – not by resisting CBDC, but by embracing it and leading its integration. The cards in my wallets may one day share space with central bank digital currency, but the familiar logos of Visa and Mastercard can still sit at the top, not just as cards, but as digital trust symbols. By taking the initiative now – guided by rigorous behavioural insights and a bold vision – the global card networks will continue to thrive as essential infrastructure providers in a new era of programmable, cross-border payment ecosystems.



CBDC as Catalyst – Future Vision. Illustration: An image of a globe or network graph where CBDC symbols (e.g., digital euro, digital dollar icons) are interconnected by Visa/Mastercard nodes, showing the networks linking various national CBDCs into one unified payment web. A caption might read: "Visa & Mastercard as the connective tissue of global digital currencies." This final visual reinforces the message: CBDCs can supercharge the network's reach and utility rather than diminish them.

Global CBDC Hub – Visa/Mastercard as the Interoperability Backbone

This visual shows Visa and Mastercard at the centre of a network of national CBDCs (EUR, USD, GBP, RON, CHF, SEK). The strategic implication is clear: CBDCs will be domestic systems, but commerce will not. Central banks have no mandate to develop cross-border interoperability – but Visa and Mastercard already operate the world's only universally accepted cross-border payment platforms.

In a fragmented CBDC world, someone must handle:

- FX conversion between digital currencies;
- interoperability between heterogeneous national CBDC designs;
- compliance, fraud screening, and AML checks in multi-jurisdiction flows;
- settlement messaging and dispute-handling between sovereign systems.

Each of these roles is *outsourced by design* from central banks – and naturally positioned for card networks.

By positioning themselves as the **CBDC Interoperability Layer**, Visa and Mastercard can:

- continue earning margins on cross-border flows, even when settlement moves to CBDC;
- embed their scheme rules as the safety and consumer-protection layer above sovereign rails;
- provide infrastructure for CBDC-to-CBDC commerce, becoming indispensable in a post-card world.

This visual, therefore, signals a future in which Visa/Mastercard do not compete with CBDCs but becomes the **connective tissue** of a global digital money ecosystem.

In summary, CBDCs should be regarded by Visa Europe and Mastercard not as the end of an era, but as the start of a new one – a period where those who utilise data-driven consumer insights and adapt their strategies will lead the next generation of payments.