

e-HKD Pilot Programme

High-Level Summary

The e-HKD Pilot Programme is a key component of the HKMA's three-rail approach in paving the way for a possible implementation of a retail central bank digital currency (CBDC). The pilot programme enables HKMA's collaboration with the industry to examine innovative use cases and maximise Hong Kong's readiness for a potential e-HKD.

The Hongkong and Shanghai Banking Corporation Limited (HSBC) was one of the institutions selected to participate. Collaborating with the Hong Kong University of Science and Technology (HKUST), HSBC sought to explore possible e-HKD every-day payment use cases, focusing on programmability as a value-add feature of digital currency as well as payment rail efficiency. HSBC and HKUST constructed a one-week pilot on the HKUST campus, which included 148 students and 5 merchants. The pilot aimed to test the following two hypotheses:

Hypothesis 1 - A more efficient payment rail: Whether a Hypothetical CBDC (e.g. e-HKD) on Distributed Ledger Technology (DLT) could be a more operationally efficient payment rail, including whether it could achieve near instant transfer¹ of value and lower transaction fees that merchants could pass on to consumers.

Hypothesis 2 - Programmability of digital money: Whether a Hypothetical CBDC could enable more effective discount and reward mechanisms using programmability, allowing merchants to provide savings promotions to their customers to drive customer loyalty and repeated business.

It is important to recognize that the specific results and findings from this first phase of the e-HKD pilot should be considered in the context of the experiment's necessary limitations. The pilot operated as a closed-loop system with HSBC as the only participating bank. It did not connect to the HKMA or involve outside infrastructure and operations beyond the immediate HKUST ecosystem. In addition, the sample size was limited to a one-week pilot involving only HKUST campus merchants, with HSBC providing 'free' e-HKD tokens to customers, which may have impacted participants' behaviour.

Within these stated limitations, these findings and their underlying principles are intended to contribute to the on-going discussions and experimentation around a potential launch of a retail CBDC in Hong Kong. The insights gained and lessons learned in this pilot provide an initial picture of what a CBDC ecosystem in Hong Kong may look like, including with respect to consumer but are not conclusive of the final design (should an e-HKD be launched). It may help stakeholders determine appropriate next steps in subsequent phases of e-HKD development.

Key Findings and Learnings

Hypothesis 1: A more efficient payment rail:

1. **Near-instant value transfer via digital token:** Our DLT infrastructure (a private blockchain) enabled near instant value transfer of hypothetical e-HKD tokens from customer to merchant wallets at a transaction level, in exchange for merchant goods offered on campus (e.g. lunch, coffee). During the one-week pilot, our solution demonstrated this through the successful completion of 405 payment transactions / purchases by 148 participants at five merchants on campus, totaling value worth HKD 14,862.
2. **Operational Efficiency:** Similar to standard cash-based transactions, the hypothetical e-HKD tokens moved near-instantly and efficiently between customer and merchant wallets, with no intermediaries.

It should be noted that the closed loop nature of this pilot does not allow final conclusions regarding operational efficiency between multiple parties in a full-fledged retail CBDC environment, or payment finality, although value was transferred to allow the purchase of the relevant goods by the participants. Subsequent phases of e-HKD experimentation should be scaled beyond the experiment limitations highlighted above to fully test the outcomes of near-instant settlement and operational efficiency.

Through surveys and interviews, we also gained the following insights:

1. **Potential for faster transaction processes:** All merchants interviewed indicated that a faster time for completing transactions is important. They would accept e-HKD if these time periods were comparable to the benchmark "T+1". However, merchants would particularly appreciate e-HKD if these times could be same day, which could improve their cashflow and allow them to make payments to suppliers daily.
2. **Potential for lower transaction fees:** Merchant interviews also indicated that transaction fees were a primary concern, and that merchants would be happy to adopt e-HKD if transaction fees were comparable to existing industry benchmark. Merchants would be even more inclined to adopt e-HKD if the fee could be lower than the benchmark.

¹ Conventional payment systems already allow for funds to be settled in real-time, but merchants may not necessarily receive their money in real-time due to downstream business processes or norms

Hypothesis 2: Programmability of Digital Money:

1. **Programmability to issue rewards:** Our DLT infrastructure supported smart contract programmability that automated reward payments to customers for transactions that met pre-defined conditions. The pilot had two Reward Days during which customers who made qualified transactions automatically received hypothetical e-HKD reward tokens to put towards a subsequent purchase (like 'cashback' promotions in existing promotion models).
2. **The Rewards implemented provided operational efficiencies:** By embedding automatic verifications of the pre-defined conditions within the smart contract, merchants ran more operationally efficient promotional campaigns. Although the pilot tested a simple programmable reward promotion with limited smart contract template parameters, it was observed that merchants can offer effective incentives to drive customer behaviour in a cost-effective and operationally efficient manner.

Future smart contract functionality could allow promotional conditions to continue to be added at the merchant level and at their discretion. This contrasts with existing models, where merchants either rely on a payment service provider / e-marketplace that charges for the management of a campaign on their networks or merchants must fund promotions themselves.

3. **The Rewards feature resulted in increased spending on promotion days:** On the two Reward Days, 173 reward payments were made back to customers. This promotion incentivized customers to enter more transactions on both Reward Days, with a 49% and 85% increase each day, respectively, compared to daily average. It also motivated customers to make higher value purchases on the Reward Days to earn rewards.

While the pilot did not compare the effect of this programmable reward promotion to that of other merchant promotions in that same period, it demonstrated that programmable promotions have the potential to work operationally efficient.

Through surveys and interviews, we have also drawn the following conclusions:

1. **Ease in enjoying promotion for customers:** Customers found the automatic Reward feature attractive. Most customers felt that existing promotions were not as convenient. Customers conveyed high appreciation for programmability if e-HKD could simplify the promotion journey and cover multiple merchant promotions under a single umbrella.
2. **Ease in offering promotion for merchants:** The merchants showed a great interest in this feature. All participating merchants were highly interested in ease of promotion, but the cost of existing promotion methods hindered them from offering promotions as often as they wanted. The merchants indicated that they would offer more sophisticated and/or frequent promotions if they could use smart contract programmability.

General perceptions of e-HKD:

In addition to the above, we derive additional insights on customer and merchant perceptions of e-HKD in general.

The survey and interviews conducted revealed that both customers and merchants have a positive perception of e-HKD. Customers expect e-HKD to be at least as easy to use as e-Wallets, widely accepted by merchants, secure and protected as commercial bank products, and as easy to enjoy promotions as credit cards. Merchants expect e-HKD to be at least as easy to process payments as e-Wallets, on par or below cost with the industry benchmark, as fast as the "T+1" practice in terms of settlement time, but preferably within a day, and as widely accepted by customers as e-Wallets.

Customers also regarded ease of enjoying promotions as a "cool" unique feature. Merchants also showed great interest in automatic rewards. If lower transaction fees and more efficient automatic rewards could lead to price discounts and more frequent and sophisticated promotions, it could trigger a positive feedback loop between customers' and merchants' adoption.

Next Steps

The operations, surveys, and interviews related to this Hypothetical e-HKD suggest that continued efforts to further explore the potential of e-HKD as a payment method in Hong Kong are appropriate. In addition to the required improvements in the user experience such as ease of payment, ease of setup, a few directions for future research are recommended. These include:

- ◆ Potential use cases of programmability on DLT should be further explored and tested, running more field experiments on other advanced programmability features, such as cash on delivery and identity-based discounts and redistribution.
- ◆ Develop sandbox infrastructure based on production design to perform a viability assessment for digital currency (e.g. CBDC) issuance and cross-bank management.
- ◆ Use cases in testing how digital currency (e.g. CBDC) can support further developments in financial instruments, including digital assets.
- ◆ Scaling of the pilot scope to cater a greater volume of customers and merchants would help further test the existing hypotheses, in addition to testing new ones.

For more information about HSBC's Hypothetical e-HKD pilot, please visit:

Eng: <https://www.about.hsbc.com.hk/news-and-media#hypothetical-e-hkd>

Chi: <https://www.about.hsbc.com.hk/zh-hk/news-and-media#hypothetical-e-hkd>

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