



HONG KONG MONETARY AUTHORITY
香港金融管理局

Oversight of
Financial Market Infrastructures
by the Hong Kong Monetary Authority

Date: 15 October 2019

TABLE OF CONTENTS

Sections

A.	BACKGROUND	
1.	Introduction	1.1
2.	Mandate of the HKMA to oversee financial market infrastructures	2.1 – 2.4
B.	OVERSIGHT FRAMEWORK	
3.	Payment Systems and Stored Value Facilities Ordinance	3.1 – 3.7
4.	International standards	3.8 – 3.11
5.	Thematic Subjects related to FMI Oversight	3.12 – 3.16
C.	OVERSIGHT APPROACH	
6.	Introduction	4.1 – 4.2
7.	Off-site reviews and continuous monitoring	4.3
8.	On-site examinations	4.4
9.	Independent reviews	4.5
10.	Meeting with the management of the system operators, the settlement institutions and/or the Hong Kong Trade Repository	4.6
11.	Follow-up action	4.7
D.	CO-OPERATIVE OVERSIGHT ARRANGEMENTS	
12.	Introduction	5.1
13.	Co-operation with domestic regulators	5.2
14.	Co-operation with regulators outside Hong Kong	5.3 – 5.6
E.	ACCOUNTABILITY	
15.	Roles of the Financial Market Infrastructure Oversight team	6.1
16.	Process Review Committee	6.2
17.	Disclosure and transparency	6.3
18.	Payment Systems and Stored Value Facilities Appeals Tribunal	6.4- 6.5

OVERSIGHT OF FINANCIAL MARKET INFRASTRUCTURES BY THE HONG KONG MONETARY AUTHORITY

A. BACKGROUND

Introduction

- 1.1 Financial market infrastructures¹ (FMIs) that facilitate the clearing, settling or recording of payments, securities, derivatives or other financial transactions constitute an essential foundation for the smooth functioning of an advanced economy, and play a critical role in fostering financial stability. It is therefore important for central banks and monetary authorities to oversee key FMIs to promote their safety and efficiency. This document² describes the approach adopted by the Hong Kong Monetary Authority (HKMA) in its oversight of FMIs in Hong Kong under its purview.

Mandate of the HKMA to oversee financial market infrastructures

Policy objectives

- 2.1 The effective functioning of the FMIs is essential to the monetary and financial stability of Hong Kong and to the functioning of Hong Kong as an international financial centre. The policy objectives of the HKMA in overseeing the FMIs in Hong Kong are to promote the general safety and efficiency of the FMIs, to limit systemic risk and to foster transparency. The aim of the HKMA's oversight work is to make the FMIs more resilient to financial crises and to protect the monetary and financial systems in Hong Kong from possible destabilising effects arising from disruption to the functioning of the FMIs.

Systems designated under the Payment Systems and Stored Value Facilities Ordinance

- 2.2 The Clearing and Settlement Systems Ordinance (CSSO), which came into effect on 4 November 2004, establishes a statutory regime for the Monetary Authority³ (MA) to designate and oversee clearing and settlement systems (CSSs) that are material to the monetary or financial

¹ FMIs include systemically important payment systems, central securities depositories, securities settlement systems, central counterparties, and trade repositories. See Annex 1 for details.

² This document was first issued on 28 March 2013.

³ The Monetary Authority (MA) is an individual appointed by the Financial Secretary of the Hong Kong Special Administrative Region under the Exchange Fund Ordinance in Hong Kong. He is the chief executive of the HKMA, which is an office comprising staff appointed to assist the MA in the exercise of his functions.

stability of Hong Kong or to the functioning of Hong Kong as an international financial centre. The HKMA is therefore empowered to designate and oversee CSSs on an ongoing basis to ensure their compliance with the CSSO.

- 2.3 On 13 November 2015, the CSSO was amended and retitled as the Payment Systems and Stored Value Facilities Ordinance⁴ (Ordinance) to introduce a regulatory regime for stored value facilities and retail payment systems in addition to the existing oversight framework for CSSs under the pre-amended CSSO. As far as the designated CSSs are concerned, all designations, certificates of finality and exemptions granted under the pre-amended CSSO continue to have effect under the Ordinance.

Systems owned and operated by the HKMA

- 2.4 One of the policy objectives of the HKMA is to help maintain Hong Kong's status as an international financial centre, including the maintenance and development of Hong Kong's financial infrastructures. The HKMA plays a key role in developing a safe and efficient financial infrastructure in Hong Kong, which is essential to the stability and integrity of the monetary and financial systems. Among the financial infrastructures, the Hong Kong Dollar Clearing House Automated Transfer System⁵ (Hong Kong dollar (HKD) CHATS – Hong Kong dollar RTGS system in Hong Kong), the Central Moneymarkets Unit⁶ (CMU - the debt securities settlement system in Hong Kong), the Over-the-Counter Derivatives Trade Repository (HKTR) and the Faster Payment System (FPS) are owned and operated by the HKMA. The HKMA therefore has a duty to ensure these systems are operated in a safe and efficient manner and apply appropriate oversight standards.

B. OVERSIGHT FRAMEWORK

Payment Systems and Stored Value Facilities Ordinance

- 3.1 The Ordinance establishes a statutory regime for the MA to designate and oversee CSSs. The objective is to promote the general safety and efficiency of designated CSSs. As the overseer, the MA monitors the compliance of designated CSSs with the safety and efficiency requirements stipulated in the Ordinance and, where appropriate, instigates changes to designated CSSs to bring them into compliance with the requirements.

⁴ The Payment Systems and Stored Value Facilities Ordinance is available at <https://www.elegislation.gov.hk/hk/cap584!en>.

⁵ Hong Kong dollar CHATS is the Hong Kong dollar RTGS system in Hong Kong.

⁶ CMU is the debt securities settlement system in Hong Kong.

- 3.2 The Ordinance also provides statutory backing to the finality of settlement for transactions made through the CSSs designated under the Ordinance by protecting the settlement finality from insolvency laws or any other laws. The MA is empowered to issue a certificate of finality to a designated CSS if it meets certain criteria specified in the Ordinance.

Exemptions granted by the Monetary Authority

- 3.3 The MA has exempted the system operator (SO) or settlement institution (SI) of some designated CSSs from certain obligations imposed under the Ordinance or from the application of certain provisions of the Ordinance. Such exemptions are granted in accordance with the requirements set out in the Ordinance.

Explanatory notes and guidelines

- 3.4 The MA is empowered to issue explanatory notes and guidelines to explain its role, policies and requirements in relation to the designation and oversight of CSSs under the Ordinance. To enhance the transparency of the designation and oversight functions of the MA, the HKMA has issued the *Explanatory Note on Designation and Issuance of Certificate of Finality*⁷ (the Note) which explains the policies and procedures that the MA intends to follow with respect to the designation of CSSs and the issuance of certificates of finality under the Ordinance. The Note also outlines the major obligations of a designated CSS, the power of the MA in respect thereof, and the appeal mechanism in respect of designation, revocation of designation and issuance, suspension, or revocation of certificates of finality.
- 3.5 The HKMA has also issued the *Guideline on the Oversight Framework for Designated Clearing and Settlement Systems*⁸ under section 54(1)(a) of the Ordinance which explains the MA's interpretation of the oversight requirements, including the safety and efficiency requirements under sections 7 and 8 of the Ordinance and the process that the MA intends to follow in his oversight of the CSSs designated under the Ordinance.
- 3.6 As regards the power to impose sanctions, the HKMA has issued the *Guideline on Exercising Power to Order a Pecuniary Penalty*⁹ under section 54(1E) of the Ordinance to set out the manner in which the

⁷ The Explanatory Note on Designation and Issuance of Certificate of Finality is available at http://www.hkma.gov.hk/media/eng/doc/key-functions/banking-stability/oversight/explanatory_note.pdf.

⁸ The Guideline on the Oversight Framework for Designated Clearing and Settlement Systems is available at <http://www.gld.gov.hk/egazette/pdf/20162020/egn201620202777.pdf>.

⁹ The Guideline on Exercising Power to Order a Pecuniary Penalty is available at https://www.hkma.gov.hk/media/eng/doc/key-functions/Guideline_on_Exercising_Power_to_Order_a_Pecuniary_Penalty_PSSVFO_ENG.pdf.

power to order a pecuniary penalty under section 33Q(2)(a) of the Ordinance is to be exercised.

- 3.7 To date, the following systems were designated under the Ordinance, to which certificates of finality have been issued by the MA:
- a) HKD CHATS (including the HKD FPS);
 - b) US Dollar Clearing House Automated Transfer System (USD CHATS);
 - c) Euro Clearing House Automated Transfer System (Euro CHATS);
 - d) Renminbi Clearing House Automated Transfer System (RMB CHATS) (including the RMB FPS);
 - e) CMU; and
 - f) Continuous Linked Settlement System (CLS).

International standards

- 3.8 The HKMA has committed to comply with the international regulatory standards on FMIs. Specifically, the HKMA adopts the *Principles for Financial Market Infrastructures* (PFMI) issued jointly by the Committee on Payments and Market Infrastructures (CPMI) of the Bank for International Settlements (BIS) and the International Organization of Securities Commissions (IOSCO) in April 2012¹⁰. The PFMI replace, harmonise and strengthen various earlier standards on FMIs, and aim at making the FMIs more resilient to financial crisis and fostering their safety and efficiency. The PFMI contain twenty-four principles for FMIs and five responsibilities of regulatory authorities to provide for the effective regulation, supervision and oversight of FMIs.
- 3.9 On 28 March 2013, the HKMA publicly announced its policy intention to adopt the PFMI, and the PFMI (including the twenty-four principles and the five responsibilities) came into effect on same day.
- 3.10 For FMIs under HKMA's purview, the new requirements under the PFMI have been incorporated into the oversight guidelines issued by the HKMA, after consulting relevant parties. The HKMA published a separate guideline on *Application of Principles for Financial Market Infrastructures to Designated Clearing and Settlement Systems*¹¹ under section 54(1)(a) of the Ordinance and revised the *Guideline on the Oversight Framework for the Hong Kong Trade Repository*¹². The two

¹⁰ The PFMI report is available at <http://www.bis.org/publ/cpss101a.pdf> ; or <http://www.iosco.org/library/pubdocs/pdf/IOSCOPD377.pdf>.

¹¹ The Guideline on Application of Principles for Financial Market Infrastructures to Designated Clearing and Settlement Systems is available at <http://www.gld.gov.hk/egazette/pdf/20162020/egn201620202778.pdf> .

¹² The Guideline on the Oversight Framework for the Hong Kong Trade Repository is available at http://www.hkma.gov.hk/media/eng/doc/key-functions/banking-stability/oversight/TR_guideline.pdf.

guidelines adopt the relevant requirements as specified in the PFMI and the additional note *Application of the Principles for Financial Market Infrastructures to central bank FMIs*¹³ issued by CPMI-IOSCO. All FMIs under HKMA's purview are required to observe the relevant PFMI applicable to them. The HKMA has also adopted the five responsibilities under the PFMI into its oversight framework.

- 3.11 The FMIs under HKMA's purview are generally in compliance with the PFMI requirements since 31 December 2015, and are required to observe the relevant requirements in the PFMI on an ongoing basis. They are subject to PFMI assessment regularly by the HKMA. The outcome of the assessments will be published on the HKMA's website.

Thematic Subjects related to FMI Oversight

Cyber Security

- 3.12 Amid more frequent and increasing sophistication of cyber-attacks in recent years, the HKMA attaches great importance to the cyber resilience of the FMIs under its purview. In this respect, FMIs are required to comply with the cyber resilience requirements stipulated by the HKMA and relevant international standards set by the CPMI of the BIS. Among others, the CPMI published the *Guidance on cyber resilience for financial market infrastructures*¹⁴ in June 2016 to enhance the ability of FMIs to pre-empt and respond to cyber attacks, and another report on *Reducing the risk of wholesale payments fraud related to endpoint security*¹⁵ in May 2018 to set out a strategy to mitigate endpoint security risk for the wholesale payment ecosystem. The strategy consists of seven elements and aims to address areas relevant to preventing, detecting, responding to and communicating about fraud. The HKMA will work with the FMIs under its purview to strengthen their cyber resilience and endpoint security taking into account developments in the cyber security space on an ongoing basis.

Resolution

- 3.13 Resolution of banks refers to the orderly management of bank failure so that the failing bank can continue to provide critical services to its depositors and customers. It is therefore important for a bank in resolution to continue to have access to the clearing and settlement services provided by the FMIs for the participant concerned to function

¹³ The note on Application of the Principles for Financial Market Infrastructures to central bank FMIs is available at <http://www.bis.org/cpmi/publ/d130.pdf> .

¹⁴ The Guidance on cyber resilience for financial market infrastructures is available at <https://www.bis.org/cpmi/publ/d146.htm> .

¹⁵ The report on "Reducing the risk of wholesale payments fraud related to endpoint security" is available at <https://www.bis.org/cpmi/publ/d178.htm> .

properly during resolution. To this end, the Financial Stability Board (FSB) published in July 2017 the *Guidance on Continuity of Access to Financial Market Infrastructures for a Firm in Resolution*¹⁶ to set out the relevant requirements for FMI service providers, FMI participants, FMI overseers and resolution authorities to follow. Being the FMI overseer, the HKMA works in concert with relevant stakeholders to meet the FSB's requirements so as to ensure that a participant of the designated CSSs will continue to have access to the FMIs in case of resolution.

Oversight of Faster Payment System in Hong Kong

- 3.14 The FPS is subject to the oversight of the HKMA. Since the FPS in Hong Kong went live on 18 September 2018, the PSSVFO provides statutory backing to the finality of settlement for transactions made through the HKD FPS (as part of the HKD CHATS) and RMB FPS (as part of the RMB CHATS) by protecting the settlement finality from insolvency laws or any other laws.
- 3.15 Given the FPS' role as an important piece of FMI serving the retail segment with unique system features, the HKMA has formulated a new framework to oversee the FPS, which includes (i) oversight requirements currently applied to CHATS being CSSs; (ii) applicable PFMI; and (iii) drawing reference from relevant overseas experiences in overseeing faster payment systems.
- 3.16 The HKMA will keep in view the suitability and adequacy of the FPS oversight framework from time to time taking into account system behaviours, feedback from stakeholders, overseas developments, international guidance, etc., and consider fine-tuning the framework as appropriate.

C. OVERSIGHT APPROACH

Introduction

- 4.1 Oversight follows a risk-based approach to continuously monitor and assess the compliance of FMIs under HKMA's purview focusing on areas of high risk using a variety of techniques aimed at detecting problems at an early stage.

¹⁶ The Guidance on Continuity of Access to Financial Market Infrastructures for a Firm in Resolution is available at <http://www.fsb.org/2017/07/guidance-on-continuity-of-access-to-financial-market-infrastructures-fmis-for-a-firm-in-resolution-2/>.

4.2 The HKMA conducts annual assessments of the compliance of each FMI under its purview. The oversight is conducted through one or more of the following methods:

- a) off-site reviews and continuous monitoring;
- b) on-site examinations;
- c) independent reviews;
- d) meeting with the management of the SOs, the SIs and/or the HKTR; and
- e) follow-up action.

Off-site reviews and continuous monitoring

4.3 Off-site reviews and continuous monitoring form the core of the HKMA's oversight approach. The reviews enable the HKMA to evaluate the degree of compliance of FMIs under its purview with the relevant requirements and to conduct cross-institutional or peer group analysis. Monthly information is collected on transaction volumes and values, system performance statistics, incidents of default and non-compliance with operating rules, and significant events in the coming months, which may have risk implications for each FMI under its purview. In addition, the HKMA also requires the SOs, the SIs and/or the HKTR, as appropriate, of each FMI under its purview to provide supplementary information for off-site reviews. The information includes submissions of periodic independent reviews on various risk areas, business continuity plans, and data on the financial strength and commitment of the SOs, the SIs and/or the HKTR, which should also report any delays or abnormal events of the FMIs under its purview as soon as possible. This should be followed by a written report to the HKMA within a reasonable time specified by the HKMA, explaining the cause and impact of the event, and the remedial action taken.

On-site examinations

4.4 On-site examinations complement the HKMA's off-site reviews and provide it with the opportunity to assess at first-hand how the FMIs under the HKMA's purview are being operated, managed and controlled. On-site examinations are conducted when necessary and their frequencies vary from FMI to FMI. In general, the scope of an on-site examination will focus on priority areas identified through the off-site review. These include high-risk areas or where control process validations are needed. An on-site examination report, identifying any area of weakness or concern and making recommendations for remedial action, will be issued to the SOs, the SIs and/or the HKTR.

Independent reviews

- 4.5 To supplement off-site reviews and on-site examinations, the HKMA may request the SOs, the SIs and/or the HKTR as appropriate, to submit an independent review conducted by professional parties on high-risk areas or other areas of concern to assist the HKMA in deciding whether the FMI is in compliance with the relevant requirements.

Meeting with the management of the system operators, the settlement institutions and/or the Hong Kong Trade Repository

- 4.6 The HKMA holds annual meetings with senior management of the SOs, the SIs and/or the HKTR, as appropriate, of each FMI to discuss the findings of the off-site reviews (and on-site examinations if conducted), particularly any significant deficiencies in safety and efficiency identified, or any other matters of concern or mutual interest. The meetings also enable the HKMA to better understand how the SOs, the SIs and/or the HKTR view and control risks and how they assess their business situation and future development.

Follow-up action

- 4.7 Following evaluation of the compliance of a FMI under its purview, the HKMA may make recommendations to the SOs, the SIs and/or the HKTR, as appropriate, asking them to take steps to meet the oversight requirements and address the issues of concerns. It will then closely monitor implementation of the recommendations by the SOs, the SIs and/or the HKTR.

D. CO-OPERATIVE OVERSIGHT ARRANGEMENTS

Introduction

- 5.1 The HKMA has established co-operative oversight arrangements with relevant authorities both at domestic and international level in accordance with Responsibility E under the PFMI. The co-operative oversight arrangements serve to foster efficient and effective communication and consultation in order to support each other in fulfilling their respective mandates with respect to FMIs.

Co-operation with domestic regulator

- 5.2 The HKMA and the Securities and Futures Commission (SFC) are the overseers of FMIs under their respective jurisdictions pursuant to the Ordinance and the Securities and Futures Ordinance (SFO) respectively. As there are cases where an FMI overseen by the SFC may also be a participant of an FMI overseen by the HKMA, or vice versa, to avoid the possibility of introducing any incompatible regulatory requirements, the

HKMA and the SFC have entered into a memorandum of understanding (MOU) in November 2004 to set out the co-operative oversight arrangements between the two regulators, including the arrangements for mutual consultation. The MOU¹⁷ was further updated in September 2019 taking into account developments since 2004 to further strengthen the cooperative oversight arrangements between the two regulators.

Co-operation with regulators outside Hong Kong

Continuous Linked Settlement System (CLS)

- 5.3 The MA designated and granted a certificate of finality to CLS under the Ordinance. CLS Bank is regulated and supervised by the US Federal Reserve as an Edge corporation¹⁹. The HKMA participates in the co-operative oversight arrangements of the CLS and is a member of the CLS Oversight Committee (OC). The co-operative oversight arrangement is specified in the *Protocol for the Cooperative Oversight Arrangement of CLS*²⁰ signed by the central banks/monetary authorities overseeing the CLS, including the HKMA. The HKMA will use the information obtained from the OC, among other things, to consider whether the CLS continues to meet the requirements under the Ordinance.

Cross-border links established with financial market infrastructures outside Hong Kong

- 5.4 The HKMA co-operates with overseas authorities in the oversight of cross-border links established between FMIs in Hong Kong and those in overseas jurisdictions. Appropriate co-operative oversight frameworks are established to assist authorities in both jurisdictions to discharge their oversight functions.

SWIFT Oversight

- 5.5 SWIFT is a global messaging network which allows financial institutions to transmit information and instructions in a standardised manner. In Hong Kong, many financial institutions including banks and FMIs (including CHATS and CMU) are running on SWIFT platforms to exchange financial instructions and messages.

¹⁷ The memorandum of understanding is available at https://www.hkma.gov.hk/media/eng/doc/key-functions/banking-stability/oversight/MOU_PSSVFO.pdf.

¹⁹ An Edge Act corporation is a corporation chartered by the Federal Reserve of the United States under the Edge Act to engage in international banking operations. The Federal Reserve Board acts upon applications by U.S. and foreign banking organizations to establish Edge corporations.

²⁰ The Protocol for the Cooperative Oversight Arrangement of CLS - http://www.federalreserve.gov/paymentsystems/cls_protocol.htm.

- 5.6 Given the common use of SWIFT by financial institutions and FMIs around the globe and the system interdependencies so entailed, any disruptions in SWIFT's services may give rise to systemic implication. To this end, the HKMA participates in the SWIFT Oversight Forum, which comprises senior overseers from major central banks, to share SWIFT-related information and discuss SWIFT oversight issues, including cyber security matters and customer security framework.

E. ACCOUNTABILITY

Roles of the Financial Market Infrastructure Oversight team

- 6.1 The oversight of the designated CSSs and the HKTR within the HKMA is performed by the Financial Market Infrastructure Oversight (FMIO) team, which is segregated from the Financial Infrastructure Department (FID)²¹ of the HKMA to maintain checks and balances. There are effective "Chinese wall" arrangements to avoid any potential conflicts of interest. All information obtained by the FMIO team during the oversight process is kept strictly confidential and solely used for oversight purposes.

Process Review Committee

- 6.2 The Process Review Committee (PRC) is composed of independent members. Its mandate is to review the processes and procedures adopted by the MA in making decisions relating to or affecting the designated systems in which the MA has a legal or beneficial interest. This arrangement helps ensure that the same set of oversight standards is applied to all designated systems, whether or not the MA has an interest in them. The PRC is required to submit annual reports and, if appropriate, special reports to the Financial Secretary of the Hong Kong Special Administrative Region (FS). With the approval of the FS, its annual report is published in full on the HKMA website to promote transparency.

Disclosure and transparency

- 6.3 The FMIO team aims at transparency in its oversight of the FMIs as far as this is compatible with the security of the various FMIs under its purview and the legitimate confidentiality of data handled by or relevant to these FMIs. Information regarding the oversight objectives, policies, the framework and the approach taken is available on the website and in various publications of the HKMA. The information will be updated

²¹ The Financial Infrastructure Department is a department within the HKMA responsible for the operation and development of the financial infrastructures in Hong Kong.

from time to time if required. As mentioned in 6.2 above, the annual reports of the PRC, with the approval of the FS, are published in full on the HKMA website.

Payment Systems and Stored Value Facilities Appeals Tribunal

- 6.4 Under section 34(1) of the Ordinance, the Payment Systems and Stored Value Facilities Appeals Tribunal (PSSVFAT) is established to hear appeals from persons who are aggrieved by a decision of the MA on:-
- a) the designation of a clearing and settlement system or a retail payment system;
 - b) the revocation of a designation;
 - c) the issuance of a certificate of finality; or
 - d) the suspension or revocation of a certificate of finality.
- 6.5 The PSSVFAT is chaired by a judge and consists of a panel of independent members appointed by the Chief Executive of the Hong Kong Special Administrative Region. The Tribunal will only meet on a need basis. The Chairman and no fewer than two members chosen from the panel will form a Tribunal to hear appeals.

Financial Market Infrastructures

The “Principles for financial market infrastructures” issued jointly by the Committee on Payments and Market Infrastructures of the Bank for International Settlements and the International Organization of Securities Commissions in April 2012 specifies that there are five key types of FMIs, which include:

(1) Payment systems

A payment system is a set of instruments, procedures, and rules for the transfer of funds between or among participants; the system includes the participants and the entity operating the arrangement. Payment systems are typically based on an agreement between or among participants and the operators of the arrangement, and the transfer of funds is effected using an agreed-upon operational infrastructure. A payment system is generally categorised as either a retail payment system or a large-value payment system (LVPS). A LVPS is a funds transfer system that settles large-value transactions between financial institutions. A retail payment system is a funds transfer system that typically handles a large volume of relatively low-value payments in such forms as cheques, credit transfers, direct debits, and card payment transactions.

(2) Central securities depositories

A central securities depository (CSD) provides securities accounts, central safekeeping services, and asset services, which may include the administration of corporate actions and redemptions, and plays an important role in helping to ensure the integrity of securities issues (that is, ensure that securities are not accidentally or fraudulently created or destroyed or their details changed). A CSD can hold securities either in physical form (but immobilised) or in dematerialised form (that is, they exist only as electronic records).

(3) Securities settlement systems

A securities settlement system enables securities to be transferred and settled by book entry according to a set of predetermined multilateral rules.

(4) Central counterparties

A central counterparty interposes itself between counterparties to contracts traded in one or more financial markets, becoming the buyer to

every seller and the seller to every buyer and thereby ensuring the performance of open contracts.

(5) Trade repositories

A trade repository is an entity that maintains a centralised electronic record (database) of transaction data.