Chapter 12

Liquidity Saving Mechanisms in Payment Systems and Settlement Liquidity:
The Experience of Japan's Next-Generation RTGS Project

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ABSTRACT

Payment systems are one of the key Financial Market Infrastructures (FMIs) and have showed remarkable progress over the past two decades. The first half of this chapter focuses on the evolutionary process of payment systems, starting with the Deferred Net Settlement (DNS) system and progressing to the Real-Time Gross Settlement (RTGS) system. Subsequently, much more sophisticated payment systems have been put in place, which include the "Hybrid System," and the "RTGS system with Liquidity Saving Mechanism (LSM)." In the latter half of this chapter, experience from the "Next-Generation Real-Time Gross Settlement" (RTGS-XG) project of BOJ-NET is discussed. BOJ-NET is the large-value payment system operated by Bank of Japan (BOJ). BOJ-NET added an LSM in 2008 and became an RTGS system with LSM. The impact of the LSM's introduction is analyzed, which includes the liquidity-saving effect, the average waiting time in the queue, the turnover ratio, and the volume of idle liquidity.

INTRODUCTION

Over the past two decades, payment systems have evolved drastically. In particular, Large-Value Payment Systems (LVPSs) have achieved breakthrough innovations in settlement mechanism design. LVPSs generally process very large-value, inter-bank payments and play a key role in the financial system.

Considering the theoretical background of this development, it is recognized that the purpose of the evolution was to improve payment systems' two evaluation criteria, safety and efficiency. More importantly, the ultimate aim was to overcome the trade-off between the two.

In the early days, there were only two types of payment systems. One was the Deferred Net Settlement (DNS) system, and the other was the Real-Time Gross Settlement (RTGS) system. There was a serious trade-off relationship between the two systems, or more concretely, between safety and efficiency in payment systems.

Looking more closely, the DNS system has the advantage in efficiency but is inferior in terms of safety. This is because the DNS system requires only a small amount of liquidity for settlement because of its use of 'netting'. In netting, participants' net positions are settled at the end of the day. The DNS system, however, is vulnerable to settlement risk because of the time gap between when the payment is sent to the system and when the net position is finally settled at the end of the day. This means that 'settlement finality' cannot be achieved until the end of the day. In addition to the late finality, the DNS system is exposed to 'systemic risk' in that the failure of one participant may cause significant liquidity or credit problems and might threaten the stability of financial market as a whole.

On the other hand, the RTGS system is superior in terms of safety, but is not as efficient in the usage of liquidity. The merit is achieved because each payment is settled individually on a real-time basis and immediately becomes final in the RTGS system. The downside, however, is that it requires a higher level of liquidity for settlement. Liquidity here refers to the account balance of each participant (typically a bank) at the central bank.

EVOLUTIONAL PROCESS OF PAYMENT SYSTEMS

Global Evolution of Payment Systems: Beyond the Trade-off between Safety and Efficiency

Historically, almost all LVPSs started their operation as DNS systems. In due course, settlement mechanisms were changed and they became RTGS systems, with the main purpose of the improvement being to reduce settlement risk. Since LVPSs settle huge amounts of funds, it was most important for the system operators, usually the central banks, to reduce settlement risk and avoid systemic risk.

Although the RTGS system is robust with respect to settlement risk, it has the drawback of requiring a large amount of liquidity for settlement. In the case of a DNS system, the liquidity required at the end of the day is the net position between the outgoing and incoming payments, usually just a small portion of the total outgoing payment amount. In the RTGS system, by contrast, the full liquidity value is required for each outgoing payment in order to make a settlement. Therefore, the liquidity burden is rather heavy in the RTGS system.

In order to ease this liquidity burden, the Liquidity Saving Mechanism (LSM) was newly invented. In an LSM, the outgoing and incoming payments are matched and settled simultaneously, either bilaterally or multilaterally. That is, the LSM allows participants to send payments on the receipt of payments from others, which activates the netting effect and enables settlements with a small amount of liquidity. The settlement engine continues to search and match payments during the day, which facilitates near real-time settlement, and intraday finality.

In this way, the RTGS system with LSM is currently the cutting-edge payment system in the world, achieving a good balance between safety and efficiency (see Table 1). These payment system developments are described in the following part of this section.

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