Chapter 7
Liquidity Saving in CHAPS: A Simulation Study

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ABSTRACT
This study uses a simulation methodology and real payment data to quantify the liquidity efficiency that could be obtained in CHAPS, the UK’s large-value payment system, by the implementation of a Liquidity Saving Mechanism (LSM). The payment data comes from payments submitted to CHAPS and, as such, reflects bank behaviour in a system without an LSM. The authors use survey data about urgent payments and bilateral limits to calibrate the simulations and make reasonable assumptions about how banks might behave in a system with an LSM. The simulations show that introducing an offsetting algorithm into the existing Real Time Gross Settlement (RTGS) set-up could result in significant liquidity savings. The authors find that liquidity savings could be of the order of 30% compared to a simple RTGS. The results suggest that the benefits, however, are unevenly distributed amongst the members: some benefit more than others. In line with other studies, there is a trade-off between liquidity savings and payment delay. Delays range from a couple of minutes to over two hours, depending upon the delay measure and the LSM set-up. Each bank will have to choose its optimal position on the savings-delay curve, depending upon the relative weight it gives to liquidity usage and payment timing. Furthermore, the authors simulate a range of different algorithms and find that liquidity savings are almost invariant across algorithms. This suggests that liquidity saving is driven by the structural imposition of two payment streams and the restriction of liquidity to non-urgent payments as opposed to the sophistication of an offsetting algorithm. The choice of algorithm does, however, have a major impact upon the size of delay that is introduced for a given liquidity saving. In practice, banks may choose to translate some of this reduction in delay into an increase in liquidity saving.

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INTRODUCTION

The 2008 financial turmoil has highlighted the potential for stressed conditions to place severe liquidity demands on banks, including significant increases in their intra-day liquidity needs. In response, authorities in the UK and abroad have developed a new regulatory framework, aimed at ensuring that banks have sufficient liquid assets available to meet a range of potential liquidity stresses. The international effort has culminated in the publication of the “Basel III: International framework for liquidity risk measurement, standards, and monitoring.” While the international community has left the question of how intraday liquidity needs are captured under this framework open for now, the UK’s banking supervisor, the Financial Services Authority (FSA), has specifically incorporated intraday liquidity risk into its liquidity regime. For the first time, intraday liquidity demands is one of the key risk drivers that banks need to consider when calibrating their overall liquid asset buffers.

The new liquidity regime will lead to an increase in the cost of providing liquidity in the payment and settlement systems and as such could lead to adverse behavioural change. In particular, banks may attempt to reduce their liquidity usage by making their payments later in the day, leading to an increase in operational risk and a reduction in system efficiency (see Ball, et al., 2011, for further discussion of intraday liquidity regulation). In order to limit the impact of regulatory changes on the smooth functioning of the UK’s large-value payment system, CHAPS, the Bank of England as the system operator, has been working with system members to develop plans for the introduction of a Liquidity Saving Mechanism (LSM). In particular, the focus has been on the introduction of an offsetting algorithm that finds pairs, or groups of payments that can be settled simultaneously but only require the net amount of liquidity in order to settle. In the rest of this chapter, the term LSM will refer to such offsetting algorithms. An LSM can provide:

1. A significant reduction in the amount of liquidity needed to settle a given value and volume of payments; and
2. Incentives for banks to submit payments earlier.

Critically, an LSM is able to provide these benefits without introducing any new settlement or credit risk, which was a key condition for the Bank of England to consider its implementation.

As part of the process for assessing the case for introducing an LSM in CHAPS, we undertook a series of simulation studies to estimate the potential liquidity savings that could be realised. We used real payments data from CHAPS and data from a survey of the UK settlement banks to make assumptions about how banks would use a system with an LSM. We tested a range of different algorithms and assessed them based upon measures of liquidity saving and payment delay.

Our results suggest that an LSM could lead to aggregate liquidity savings in excess of 30%. But these savings would come at the cost of settlement delay, ranging from a couple of minutes up to just over two hours, depending upon the delay measure and LSM set-up. Individual banks will be free to calibrate their payment flows to find their optimal position on the saving-delay curve. When we test different algorithms, we find that the sophistication of the algorithm has very little impact on the liquidity efficiency of the system. Liquidity savings are driven by the structural change whereby payments are separating to an RTGS stream for high priority payments and another stream with restricted liquidity for lower priority payments. The algorithm adds value by reducing the time that payments will be delayed for a given liquidity saving.

We test our simulations against the Bank of England’s Proof-of-Concept (PoC) trialing system. The PoC tests how introducing an LSM
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