ELSEVIER

The Quarterly Review of Economics and Finance
49 (2009) 1–25

The QUARTERLY REVIEW of ECONOMICS and FINANCE

www.elsevier.com/locate/qref

Risk control measures in payment systems

Francisco José Callado-Muñoz *

University of Girona, Department of Economics, Campus de Montilivi, 17071 Girona, Spain

Received 5 May 2006; received in revised form 21 May 2007; accepted 15 June 2007
Available online 7 July 2007

Abstract

The purpose of this paper is to make a comparative analysis of modern gross and net payment systems, emphasizing on the implications of the availability of intraday liquidity in the former and of credit limits in the latter. This allows for the comparison of both the effects on social welfare of each of the two systems and the different risk control instruments analyzed. In a numerical exercise, it is shown first, how it would be legitimate for a benevolent authority a preference for a gross system, like Fedwire, over a net system, like EURO1, for relatively high values, although plausible, of risk aversion. Second, as financial development improves, the preference for a net system shifts either to gross systems or, for some countries, to a cohabitation of both settlement modes.

PACS: G21; E51

Keywords: Payment systems; Credit; Limit; Liquidity; Intraday credit; Contagion

1. Introduction

In the last years there has been an important increase both in the volume and value of funds transferred through the different payment systems. This growth has been fostered by various factors, such as financial innovation, technological improvements and financial markets' globalization. In accordance with these developments, financial authorities have increased their attention to the adequate functioning and security of existing settlement systems.

Mainly, two kinds of payment systems can be distinguished: Gross and Net. In gross systems each payment order is processed individually and settled usually in real time, whereas in net systems, payment orders are processed on a continuous basis but their settlement is carried out at

* Tel.: +34 972 419883; fax: +34 972 418032.
E-mail address: franciscojose.callado@udg.es.

1062-9769/$ – see front matter
doi:10.1016/j.qref.2007.06.001

the end of the day for the net position of each participant with the system. So, gross systems achieve, in principle, the minimization of risk that the inability of an institution to meet its obligations affects the rest of participants. However, the counterbalance of this improvement in security is the increase in liquidity needs of banks to face each payment order. On the contrary, net systems require less liquidity since the bank should satisfy only the net debit position with the system at the end of the day. In return, they are more vulnerable to systemic risk given that there exists an automatic extension of credit among participants between the processing of the operation and its settlement.

This trade-off between risk and cost is the usual point of departure of comparisons made between gross and net payment systems[1] (Rossi, 1998). An interesting reference in this point is the work by Freixas and Parigi (1998), where they analyze thoroughly the costs and benefits of both systems taken in their simplest way.

However in the last years and as a consequence of the work carried out at the Bank of International Settlements (Lamfalussy Report (BIS (1990), "*Core Principles for Systemically Important Payment Systems*" (BIS, 2001)) several measures that aim at improving the risk-cost efficiency relationship in each system have been proposed. In the case of gross settlement systems, the goal is to achieve a reduction in the required level of reserves by means of the design and implementation of policies of intraday liquidity provision by the central bank.[2] This instrument has a positive effect on the functioning of the systems increasing the speed of payment processing, avoiding payment queues and reducing the complexity of liquidity management by participants. In the case of net systems, the improvements have tried to reduce the risk for the financial system. Although, systemic risk is, by definition, always lower in gross systems, the security in modern net systems has increased as a result of the implementation of control instruments such as quantitative limits to intraday credit. These limits allow for the reduction of the exposition of each bank to the rest of institutions as well as for a minimization of the consequences of the failure of any of the participants on the whole system.

Both, the introduction of intraday credit facilities in gross systems and the establishment of credit limits in net systems, may modify, in a relevant way, the nature of the trade-off between security and cost efficiency in the two kinds of systems, and therefore, the conditions under which one or the other can be socially preferred. Thus, intraday credit access reduces the cost borne by participants in gross systems, although credit risk could appear for central banks. On the other side, credit limits in net systems increase their security but decrease the smoothness of payment order processing.

The objective of this paper is to study the impact of credit limits and intraday liquidity provision on the risk and efficiency of payment systems. In particular, the effects of these facilities on the relative social return of each settlement systems. To carry out this task, a Diamond and Dybvig (1983) model, as adapted by Freixas and Parigi (1998) for the analysis of gross and net payment systems, is used with the introduction of an intraday credit facility, in the case of gross settlement, and credit limits, in the case of net.

There is an incipient literature that has helped our analysis. Especially appealing is the branch that analyses the influence of payment systems in the economic outcome (Rochet & Tirole, 1996a,

[1] Part of these studies appear in the special number of the Journal of Money Credit and Banking (Vol. 28, no. 4, Part 2) such as Greenspan (1996), Furfine and Stehm (1996), Berger et al. (1996), etc.

[2] Recently it has been published a document by CPSS (BIS (2003a, 2003b, 2003c, 2003d, 2003e, 2003f)) that precisely analyses the role of central bank money in payment systems and that stresses the importance of accession to intraday credit in nowadays settlement systems.