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Introduction

The purpose of this paper is to highlight some of the possible consequences for payment practices and money markets in the United Kingdom of the introduction, later in 1983, of CHAPS. CHAPS, an acronym for Clearing House Automated Payment System, is a real-time interbank sterling payments mechanism developed by the U.K. Clearing Banks. It is anticipated that CHAPS will replace the paper-based end-of-day Town Clearing as the core clearing mechanism for sterling-denominated transactions.^{1/}

All interbank clearing arrangements in the United Kingdom are operated by the U.K. (London and Scottish) Clearing Banks. Each clearer maintains an account with the Bank of England and this account is used to make and receive settlement payments to and from other clearers. The U.K. Clearing Banks are not the only providers of sterling-based payment services. Other financial institutions, including the U.K. branches of non-U.K. multinational banks, offer sterling payment services. For such institutions, however, participation in the clearing arrangement must be through a sponsoring Clearing Bank. This "two tiered" structure in which the Clearing Banks operate the interbank

*/ International Finance Division, Federal Reserve Board. This paper represents the views of the author and should not be interpreted as reflecting the views of the Board of Governors of the Federal Reserve System or other members of its staff. The paper benefited from comments on an earlier draft by Peter Clark, Robert Gemmill, Jeffrey Marquardt, and Howard Sherman.

^{1/} The Town Clearing refers to the daily exchange of large value checks drawn against the Bank of England and the City of London offices of the London Clearing Banks. Checks exchanged in the Town Clearing are for same-day value.

clearing arrangement will be perpetuated in CHAPS.

The core group in the CHAPS mechanism will consist of the 13 CHAPS settlement banks.^{2/} Each of the CHAPS settlers will have access to a CHAPS Gateway.^{3/} The Gateways are interface devices that will be linked together via the British Telecom's Packet Switching Service (a common carrier's data transmission service) and will also be connected to each settling bank's own mainframe computer system. Each bank's own computer systems will be able to support computer-to-computer connections to CHAPS for sponsored CHAPS bank participants and corporate customers.^{4/} Alternatively, sponsored banks will be able to connect to CHAPS through the SWIFT network -- see Figure 1.^{5/}

CHAPS, by design, is a very limited joint undertaking of the U.K. Clearing Banks. The joint work on CHAPS by the clearers has been limited to the development of standard interfaces, with known rules and procedures for the exchange of payment messages. The clearers' decision to create a dispersed, rather than a centralized, processing capacity for

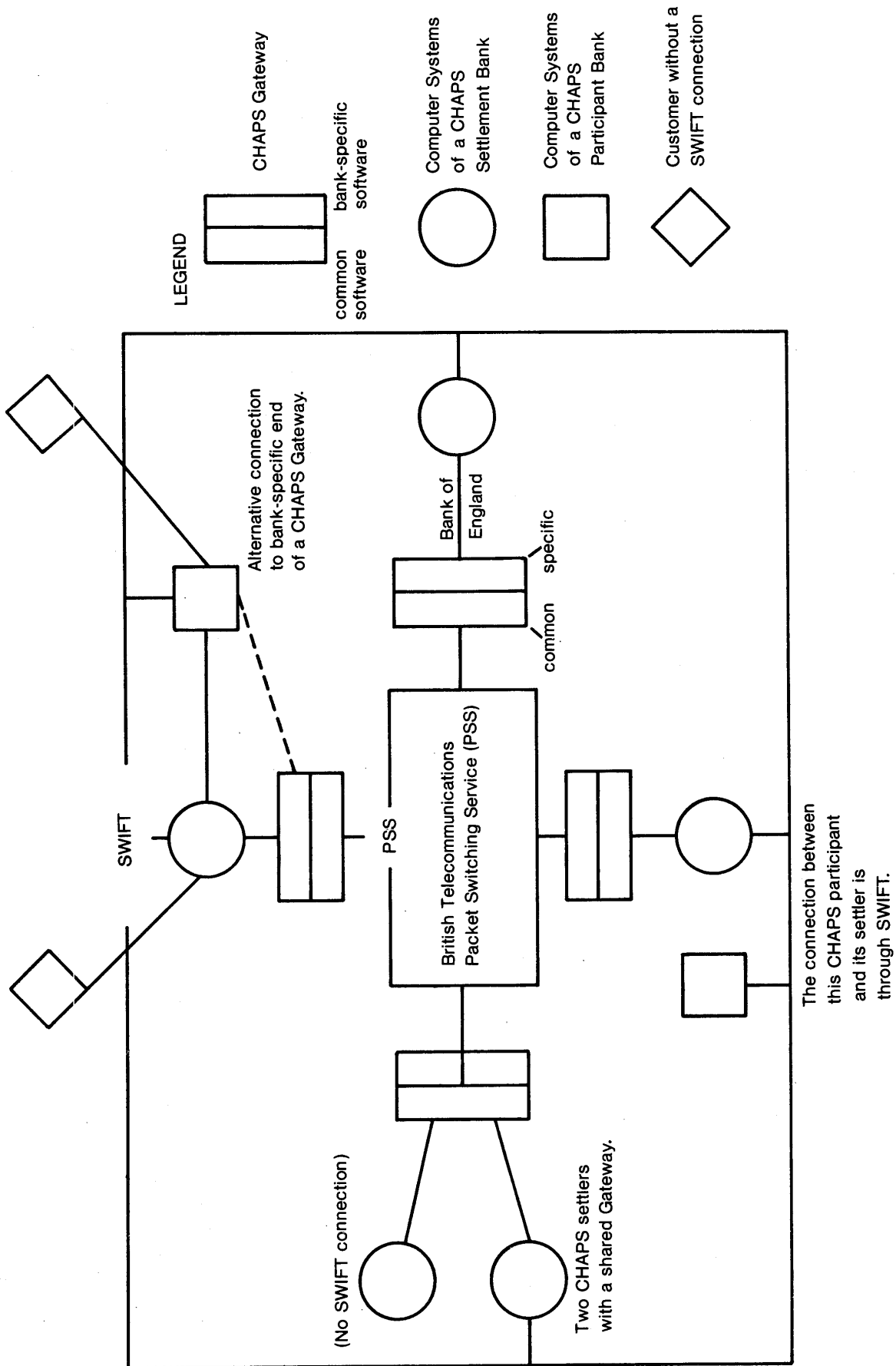
^{2/} The CHAPS settling banks are: The Bank of England, Bank of Scotland, Barclays Bank, Central Trustee Savings Bank, Clydesdale Bank, Co-operative Bank, Coutts and Co., Lloyds Bank, Midland Bank, National Girobank, National Westminster Bank, The Royal Bank of Scotland and Williams and Glyn's Bank.

^{3/} The CHAPS Gateways are computers which are specially suited to operate in a dispersed processing network. Particular attention has been paid in the technical design of CHAPS to assure the ongoing operation of the network after a failure of any one of its components.

^{4/} CHAPS participants will include some of the U.K. banking offices of other than the CHAPS settlers. A CHAPS participant will have the privilege of being able to designate its settlement bank to the operating manager of the CHAPS network. Without this privilege, a bank would have to inform, and update, all potential payors to it of its choice of settlement bank.

^{5/} SWIFT is the acronym for the Society for Worldwide Interbank Financial Telecommunication, a co-operative company created under Belgian law. It is wholly owned by member banks. SWIFT provides an international transaction processing network to which only banks (or bank-owned organizations) may connect.

CHAPS: Figure 1



CHAPS appears to have been influenced by the competitive policy regulations of the United Kingdom. These regulations stress the avoidance of pricing conventions based on any explicit agreements among competitors. Thus, the clearers' decision to avoid joint expenditures on a centralized processing capability, so as to minimize the common cost elements for their competing payment services, might have been prompted by a strong group preference to preserve an officially acceptable restricted-membership club. By contrast, the organization of U.S. interbank payments networks have been strongly influenced by banks' anticipations of strong legal challenges to agreements which restrict access of competitors to "essential facilities."

Basics of a CHAPS Payment

CHAPS payment messages enter the CHAPS network only through a settlement bank's Gateway. As soon as a message is entered and acknowledged the funds transfer is guaranteed by the sending settlement bank. In fact, a settlement bank's guarantee is binding even if a payment is subsequently found to have been fraudulently initiated -- individual payments cannot be modified once made.

A CHAPS third-party payment is initiated when a customer (a bank or a firm) of one of the settlers requests a sterling payment, either for same-day or later execution. A customer may forward CHAPS payment instructions to its settlement bank through a direct link or via the SWIFT network -- the CHAPS message format was designed to conform to SWIFT message standards. Thus a CHAPS message may be originated at any one of more than 900 banking offices in the world that are now

connected to the SWIFT network.

The rules of the CHAPS network do not require that a settling bank follow any particular procedure before determining whether a customer's payment instruction will be executed, including whether they will honor the payment requests of their sponsored CHAPS participants. Settling banks will likely monitor and control the accounts of participants relative to established bilateral credit limits, although the access provided to some participants (those most creditworthy) may be only monitored and not controlled. In any case, the balancing of credit and operational considerations of conditions for access to the CHAPS network are the responsibility of each settler.^{6/}

CHAPS settlers, when they receive a payment for a customer, have the responsibility of advising the customer of the receipt of the payment. However, the within-day availability of funds received is regarded as an area to be negotiated between a settler and each of its customers. It is likely that the service contracts for customers expected to make only a limited number of smaller payments will specify

^{6/} CHIPS (Clearinghouse Interbank Payments System) is the major computerized international payments network which served as the inspiration for the development of CHAPS. CHIPS, with 100 (mostly non-U.S. chartered) bank participants, is operated by the 12 member New York Clearing House Association. About 20 CHIPS participants settle for themselves, with half of these settling for one, or more, of the other CHIPS participants. Sponsoring CHIPS participants make a once a day decision whether to honor the settlement obligations of their sponsored banks, they (unlike their CHAPS counterparts) are not permitted to control the intraday access to the network of their respective sponsored participants.

The fact that all CHIPS payments are not authorized, when made, by the "most creditworthy" participants in the network has prompted proposals that a CHAPS-type procedure be adopted for CHIPS to reduce the risk of a settlement failure. Legal concerns about the need to assure equitable access among competitors has apparently inhibited the member banks of the New York Clearing House Associations from adopting these proposals.

that CHAPS payments not be processed if they are covered only by same-day CHAPS receipts. These restrictions will be imposed to generate float revenue and to limit the number of customers' accounts requiring expenditures on real-time monitoring and control. High-volume customers will be more likely to pay explicit fees for CHAPS payment services rather than compensating their settlers through float.

The absence of a centralized processing facility for CHAPS is reflected in its settlement process. Because there is no centralized calculation of CHAPS net settlement positions, each pair of CHAPS settlement banks must agree on the net result of a day's bilateral payments transactions. Settlement information is transmitted at the end of each business day by each settler (via its Gateway) to an automated settlement ledger at Bank of England. After a day's settlement information has been verified, the Bank of England makes the indicated transfers among the operating reserve accounts maintained with it by the settlers. If such a transfer by the Bank among its accounts generates an overdraft in the account of one of the settlers then the Bank might provide cover at a penalty interest rate.

The primary motivation for setting up CHAPS has been the banks' anticipation of large savings in labor costs from the replacement of the current procedures for executing paper-based funds transfers of large same-day sterling payments with an automated funds transfer mechanism. The adoption of an automated payments mechanism was also favored by some banks because of the opportunities such a system would create for the refinement of credit control procedures.

Operating and Credit Links with Dollar Payments Arrangements

Large-value sterling payments are now made by checks drawn on the London Clearers. These payments are "batch" processed by the payors' clearing banks only after they are received at the Town Clearing late in the afternoon. Problem checks received at the Town Clearing can be returned to the payees' banks on the same business day. Consequently, a payor's clearing bank normally will not make credit decisions until late in a day. By contrast, a CHAPS settler's acceptance of the credit risk associated with a particular CHAPS transfer accompanies the transfer. That is, a CHAPS payment is the electronic equivalent of the certification of a check by a CHAPS settler -- at a considerably lower cost than for the current cost of having a paper check certified.

End-of-day processing of sterling payments transactions through the Town Clearing encourages U.K. banking offices seeking to control customer credit exposures to schedule the execution of each day's dollar payments for late in the day. The execution of a dollar payment involves the transmission of a payment message to a U.S. banking correspondent; these messages are irrevocable commitments of the sending U.K. bank. Thus, the bunching of dollar payments processing produces higher operating costs and more credit exposure control than a more even processing of dollar transactions throughout the day.^{7/}

When the CHAPS payments network is operational, U.K. banking offices will, if they choose, have access to intraday information on

^{7/} Higher operating costs for peak-load processing of payments reflect the lumpy technical and contractual characteristics of the capital and labor inputs purchased by banks.

their customers' credit exposures. The availability of more timely information on customers' credit exposures should prove valuable since it will facilitate adoption of less costly within-U.S.-business day processing of dollar payment orders by U.K. banks (to be executed by U.S. banking correspondents) on behalf of customers.

It is anticipated that the introduction of the CHAPS techniques for sterling payments will lower the cost of funds transfers in dollars that are covered by sterling credits. Thus, the introduction of CHAPS may make it worthwhile for some firms to purchase dollar payment services from their traditional suppliers of sterling payment services. That is, the savings produced by cancellation of specific arrangements for dollar payments (such as fees or compensating balances for credit lines) may be greater for some agents than the additional costs of having orders for dollar payments transmitted over the interconnections between the sterling and dollar payments mechanism.^{8/}

Money Market Operations of the Bank of England

It is anticipated that the introduction of the CHAPS network will significantly affect the demand of the U.K. Clearing Banks for non-interest bearing demand deposits at the Bank of England. The clearers hold demand balances at the Bank of England to cover their liquidity needs generated by their preeminent roles in the sterling payments mechanism. A target level for such balances is set in negotiations between each of the clearers and the Bank of England.

^{8/} It should be noted that the choice of one payments vehicle or another is independent of any agents' underlying exchange rate exposures.

Under current payments conventions for sterling-denominated transactions, after the posted daily closing hour of 3 P.M. there are potentially 50 minutes for the clearers to exchange information so as to allow each clearer to anticipate its net position at the Town Clearing and to participate in position-squaring money-market trades. It is widely recognized that if after-hours money-market trading could indeed be limited to the clearers, the aggregate need for operating balances at the Bank of England would tend to be reduced. However, in practice, to accommodate the money-market trading of their most-valued customers, the clearers contract to receive bankers' payments for collection until five minutes before the daily close of the Town Clearing.

To process the late-in-the-day transfers of (bank and non-bank) customers, the clearers find it cost effective to raise their target end-of-day holdings of deposits at the Bank of England. Furthermore, their desired holdings are also boosted by the Bank of England's known reluctance to provide late-in-the-day liquidity adjustment facilities. The clearers do not assess customers for the costs of late-in-the-day funds transfers, or receipts, but rather assign such costs to the generally allocated overhead charges to customers using their payment clearing services. Thus, customers that utilize the late-in-the-day clearing services have not had any incentives to modify their behavior so as to reduce the costs of settlement to the clearers.

The planned schedule for the daily operations of CHAPS calls for one hour between the close of normal activity at 3 P.M. and the

completion of settlement. It will be less troublesome, compared with current paper-based payments arrangements, for the clearers to jointly police a collectively agreed time period for their exclusive use. Joint policing by the clearers of the buffer is facilitated by the online character of CHAPS operations, which require that two clearers, rather than one, must agree to process an after-hours transfer for a customer, including late-in-the-day money-market trading. Thus, the introduction of CHAPS payments technology should improve each clearer's ability to control its end-of-day cash position. In turn, the enhanced within day abilities of the clearers to predict daily cash flows should work to lower their desired end-of-day cash holdings at the Bank of England.

The daily operations of the Bank of England in sterling money-markets are designed to influence very short-term sterling interest rates.^{9/} The fulcrum of these operations is the banking system's need to acquire intraday balances at the Bank of England so that it can effect the required monetary transfers (taxes and the proceeds of debt sales) from the public to the U.K. Government through the agency of the Bank of England. In such an interest-rate targeting regime, the end-of-day reserve holdings of the clearers could not be independently targeted if the interest rate objective is fixed rather than viewed as a range of acceptable outcomes. In fact, the Bank of England has a notional target for the aggregate of the clearers' end-of-day operating balances --

^{9/} For a discussion of the current money-market techniques of the Bank of England see "The Role of the Bank of England in the Money Market" (Bank of England Quarterly Review, March 1982, pp. 86-94) and John M. Atkin "U.K. Monetary Control: The Need for Further Changes", (The Banker, November 1982, pp. 25-29).

related to the costs of its money-market operations -- and the Bank does indicate its expectations concerning their average holdings to each bank. Although the clearers are free to vary their day-to-day holdings, each is regarded to be under an obligation to hold, over time, not less than the agreed target for its reserve holdings.^{10/}

As noted above, the CHAPS-related reorganization of the sterling payments mechanism should reduce the target amount of reserves that the clearers will voluntarily hold. Alternatively stated, the reorganization will reduce the amount of settlement services required by the clearers from the Bank of England -- a reflection of the greater productivity of reserve holdings with CHAPS computerized payments techniques, as compared with the paper-based techniques now employed. However, it is possible that the Bank of England might attempt to capture some of these potential savings through a redesign of its settlement service meant to boost precautionary reserve holdings of the clearers. Nonetheless, the switch in clearings technology may be reflected in a change in the sensitivity of short-term sterling interest rates to daily changes in the ex post available supply of end-of-day balances provided by the money-market operations of the Bank of England. In particular, there would be a greater sensitivity of short-term interest rates if CHAPS augments the productivity of reserve holding more for high, as compared with low, reserve intensive payments clearing techniques. That is, money-market interest rates will be more sensitive

^{10/} A separate cash ratio (1/2 percent of eligible liabilities) scheme requires all participants in the U.K. monetary sector to hold non-operational, non-interest-bearing, fixed-term deposits with the Bank of England. The stated purpose of the cash-ratio requirement is to provide income to cover the general operations of the Bank.

to changes in the supply of reserves if the introduction of CHAPS reduces the interest-rate sensitivity of the clearers' holdings of operating balances.

Observations

CHAPS is a prototype for other national wholesale payments mechanisms. Participants in CHAPS will be able to employ standardized SWIFT techniques for funds transfers within CHAPS. CHAPS highlights the considerable flexibility that SWIFT has introduced into payments arrangements. Links among potential participants in a net settlement payments network can be readily established. Furthermore, links between bank participants and specialized facilities, such as automated ledgers to monitor network credit of individual participants, can also be readily established. The design of the CHAPS mechanism thus embodies a solution to the problem of non-indigenous bank participation in a national payments mechanism.

The CHAPS solution involves the assignment of risk management responsibilities for sterling payments arrangements to the U.K. Clearers as a group and individually. U.K. authorities have not indicated any interest in supervising the terms on which the U.K. Clearers will admit other participants to the CHAPS network, a policy based on the view that CHAPS network relationships ought to be described and maintained by the banks "responsible" for the day-to-day operation of U.K. payments arrangements.

Alternative to Domestic Dollar Arrangements

The design and organization of the CHAPS mechanism is conformable with the U.K. environment, an environment quite different

from that of the United States.

(1) The U.K. banking structure is highly concentrated, considerably different from the dispersed nature of the U.S. banking system.

(2) Sterling is a secondary international currency; it has a considerably less important international role than the U.S. dollar.

(3) The Bank of England is not an independent provider of funds transfer services. By contrast, the Federal Reserve operates its own funds transfer mechanism, the Fedwire -- the preeminent U.S. dollar funds transfer mechanism.

It has been noted that CHAPS provides the necessary infrastructure for large-scale clearing in London. Technologically, CHAPS could be readily adapted to provide clearings in both dollars and sterling, with settlement of dollar transactions processed in the United States. However, the concentration of CHAPS settlement responsibilities with only the clearers is inconsistent with the development of a major dollar clearing mechanism in the United Kingdom.^{11/} Other banks, particularly U.S. banks, would have to be involved in the assumption of risk responsibility for the enlarged credit exposures generated by large-scale dollar clearings. The diffusion of risk could be effected through an increase in the number of CHAPS settlers or by the current CHAPS settlers entering into bilateral reinsurance arrangements.

^{11/} The prominence of the concerns about credit risk is indicated in "Possible Advantages and Disadvantages of Setting up Wholesale Dollar Clearing Arrangements in London", Working Party on Wholesale Dollar Clearing (Committee of London Clearing Bankers), March 1980.

The state of the art of international financial communication favors the merging of clearing and settlement functions for wholesale transactions in any currency. It is of considerable value to banks to integrate the information generated by their cash management and payment services for corporate customers and bank correspondents with that from their own daily money-market activities. The cost of transmitting data is now low enough to justify central processing. Thus, there is now no economic rationale for the creation of a separate dollar clearing mechanism in London.

However, a restrictive policy of U.S. authorities toward net settlement mechanisms in the United States could stimulate interest in dollar clearings through CHAPS and other offshore arrangements. In particular, banks might use CHAPS (or other non-U.S. network) for dollar clearings in response to "arbitrary" restrictions that U.S. bank regulatory agencies might apply to intra-day extensions of credit in domestic U.S. payments mechanisms.^{12/}

^{12/} For discussions of possible restrictions that could be imposed by U.S. authorities see Warren Coats and Allen Frankel, "The Effects of Prohibiting Reserve Account Overdrafts", Research Papers in Banking and Financial Economics, Federal Reserve Board, September 1980; and Allen Frankel and Jeffrey Marquardt, "Payments Systems: Theory and Policy", International Finance Discussion Paper, Federal Reserve Board, 1983.