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International Supervisory and Monetary Policy Issues Raised by E-Money

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E-money has become a symbol of potential major change in the financial system. Although E-money is still in the inception stage, it has captured the imagination of the public and the official sector. Why the interest in a product which few have experienced? What issues does it raise for the coordination of supervision of internationally active institutions and for cross-border financial activity?

With respect to international policy coordination, E-money's main significance lies in the underlying set of information technology innovations. Money as a temporary store of value and day-to-day medium of exchange--historically, the starting of central banking and the financial services industry--can be conceived as purely electronic for the first time. Full-fledged electronic money suggests that the transformation of financial services from primarily a physical processing business to an information-processing business is reaching its late stages. And with electronic communication and processing, many of the

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remaining physical and technological barriers to near-immediate international financial exchange fall away.

E-money generation information technology creates the potential for major structural change within financial firms and the financial industry. These information technology innovations include open networks, primarily the Internet, the expansion of bandwidth in fiberoptic cable, and the portable microchips embedded in smart cards. These innovations interact with established and developing technologies such as large scale information processing and wireless communication to present the possibility of permit more speed and flexibility in and larger volumes of information flows. Information flows represent the content of the production and delivery of financial services.

The potential for structural change and for increases in the associated operational, strategic, and compliance risks created by E-money generation technology is consistent with the existing major challenge to supervisors of internationally active firms. Supervisors are already seeking in developing sufficient and appropriate information to conduct their supervisory activities as home and host country supervisors because of the considerable re-organization of business activities, risk management and internal controls at the firms they supervise. E-money technology simply adds to the underlying forces producing re-organization.

The potential for structural change also has ramifications for international

monetary and financial coordination. E-money is most commonly viewed as a potential substitute for cash, travellers checks and M1 type deposits. M1-type money is most important in an international context as the liquidity needed for payments and settlements. The pressure to rationalize and reduce the risk in international settlement systems can only increase as institutional and other large investors pursue international diversification strategies. E-money technology offers the opportunity to economize on such liquidity by shortening settlement times, limiting foreign exchange setlements, and possibly, reducing or eliminating the role of financial institutions serving as paying agents and custodians.

The Significance of E-Money

E-money, like other new instruments or services, can be seen as a combination of financial and technological innovations. E-money as either smart cards or transfers of value over an open network appears to be of greatest importance as a technological innovation.[1]

The technological innovations underlying E-money are chiefly the portable

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[1] The uses foreseen by E-money's developers are expected to substitute variously for cash, travellers checks, or demand deposits. An example of an innovation which is both financial and technological is the sweep account, a deposit or money market account in which cash in the account is withdrawn ("swept") late in the day and invested in interest-bearing or higher return instruments. The sweep feature created an instrument which did not exist before (essentially an interest-bearing transaction account) and automation created the capacity to conduct a sweep in the narrow window of time between certainty about end-of-day balances and the continued availability of markets.

microchip embedded in smart cards and the open networks over which E-money would be exchanged. A third important innovation, not directly related to E-money, is the expansion of bandwidth on fiberoptic cable, creating large capacity to transmit data. When combined with improved telecommunications such as satellite and wireless communication, and enormous increases in computing power on desktops and in computer roome through parallel processing and other brute force computing techniques, these innovations have the potential to reshape the production, delivery and demand for financial services.

Of these developments, the Internet has created the most excitement and may have the greatest impact on strategic thinking at financial firms, especially those in retail financial businesses. The development of search engines and a universal programming approach that interfaces with a broad range of computers and software gives the Internet the character of a universal common carrier. The word often associated with the Internet in the popular press is "democratization", referring to the immediate and direct access of Internet users to a broad range of new information made available through the network.

The potential impact of these developments on financial firms are on the supply side--the production and the delivery of financial services--and the demand side of the financial services market. Much public discussion focuses on the potential for much further evolution of the delivery system for financial services, particularly the potential of the Internet. The combination of E-money in smart

card form and the Internet suggest that financial services delivery across the full range of services could be brought into the home.

Relatively less consideration is given to the potential for substantial change in the production of financial services and the demand for those services. Some years ago, a group of Federal Reserve Bank of New York economists outlined broad trends in international financial competitiveness.[2] Three main impacts on the value-added in financial services appeared largely attributable to technological advances. They were:

1. An unbundling of the components of financial services and the stages of production of financial services, which makes it possible to organize production of those component services in an economically efficient manner, including spreading their production across multiple firms. (Mortgage lending is an example, where origination, servicing and risk management generally occur in three different types of financial firms.)
2. Erosion of the value-added of providing information and advice, as information has become more readily available to customers, especially large, sophisticated customers.
3. Declines in the value of origination and market access services as new delivery systems reduce the cost of customer search.

Federal Reserve Bank of New York, *International Competitiveness of U.S. Financial Firms: The Dynamics of Financial Industry Change,* May 1992.

E-money generation technology seems likely to perpetuate many of these trends, with an important exception. Electronic networks have the potential to enhance the ability of financial firms to gather and analyze information. Electronic delivery systems could capture considerable information about transactions, new network software may make it possible to combine information from different systems more efficiently, and wide-band fiberoptic cable may make it possible to transmit massive amounts of information for processing.

The ability to move and analyze massive amounts of information has already had a dramatic impact on the marketing and risk management of the consumer credit card business, and has reshaped its industry structure. The wider application of these techniques to other parts of the financial services business as financial and commercial transactions are captured and stored electronically in a "mobile" form could similarly reshape parts of the financial business.

This technology may further reduce the cost of unbundling of financial services and their production and to create the potential for "cherry-picking" of the valuable portions of the franchise, much as the long-distance telephone companies are experiencing. The recent wave of outsourcing is an indicator of what the future may bring.

Economies of scope deserve special attention. The foundation of the financial services business today is electronic information-processing. It seems likely that the risks, the competitive dynamics, and the policy challenges in

financial services will become more similar to those of the telecommunications and the computer hardware and software industries. Commonalities in the necessary managerial and product skills may lead to stronger links between financial services firms and software and telecommunications firms.

International Supervisory Policy Coordination

How does E-money affect international supervisory coordination? This section identifies some of the key supervisory issues raised by E-money and describes some of the detail in order to provide a sense of the content of international supervisory coordination. These issues are similar to the broad concerns currently under discussion among international financial supervisors.

Background: The New Emphasis on Risk in Supervision

The objectives of financial supervisory policy varies across supervisors, both domestically and internationally. Whatever the specific statutory or self-imposed mission of individual supervisors, special emphasis is generally placed on ensuring the sound financial condition of major financial institutions and the smooth functioning of financial markets. Federal Reserve banking supervision in particular is focused on the safe and sound operation of banks, their compliance with applicable laws and regulations, and the stability of the financial system.

In recent years, the Federal Reserve and other U.S. banking supervisors

have shifted their supervisory focus to the assessment of risk within banks and an evaluation of how risk is managed and controlled. The examination of risk management and internal controls has become a major activity within the Federal Reserve's overall bank supervisory program.[3] Other domestic and international supervisors are also increasing their emphasis on risk.

In considering E-money's implications, therefore, a useful starting point is to identify the principal risks associated with E-money generation technology. These risks are operational risk, strategic risk and compliance risk.

Operational Risk

The Nature of Operation Risk. Operational risk in the E-money context is largely synonymous with information systems risk. Operational risk is managed primarily by establishing and maintaining strong internal controls. Internal control lacks a good universal definition, and work has been proposed in both the public and private sectors to generate a common international understanding of what constitutes a strong internal control environment. The Federal Reserve's

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The Federal Reserve has issued supervisory guidance that provides a useful framework for sound risk management. The four elements of the framework are active senior management and board of directors oversight; adequate risk measurement, monitoring and management information systems; adequate policies, procedures, and limits; and comprehensive internal controls. See Federal Reserve System, Division of Banking Supervision and Regulation, SR 95-51, "Rating the Adequacy of Risk Management Processes and Internal Controls at State Member Banks and Bank Holding Companies", November 14, 1995.

Commercial Examination Manual states that:

> In general, good internal control exists when no one is in a position to make significant errors or perpetrate significant irregularities without timely detection. Therefore, a system of internal control should include those procedures necessary to assure timely detection of failure of accountability, and such procedures should be performed by competent persons who have no incompatible duties.[4]

The quality of risk management and control systems can only be as high as their weakest links. Therefore, an internal control system has to be comprehensive. Maintaining a comprehensive control system is the key challenge in an environment in which networks are open, work product in the form of information is shifted within the firm, and portions of the work may be done by outside vendors.

Developing a control process usually starts with diagramming the process from inception to final disposition (maturity, payoff, termination). From the process diagram, controls can be associated with process steps, including points of outside contact, such as customer interface, and transfers of work from one area to another. Controls can be broadly grouped into preventive (e.g., limiting access through assignment of private passwords), detective (e.g., reconciling trades entered into an accounting system with trade tickets) and corrective (e.g., freezing a credit card account with unusual transaction activity).

Federal Reserve System, Division of Banking Supervision and Regulation, *Commercial Bank Examination Manual*, Section 1010.1, "Internal Control", effective date May 1993, p. 2.

Technology can assist in the management of operational risk. Technology can reduce the number of control points by creating more seamless flows of work and automate controls at remaining points. It can reduce the time before errors or problems are detected by facilitating more frequent monitoring. It can limit the amount of financial exposure at any control point before verification or reconciliation occurs through automated checking of limits, timely updates of limit usage, and blocking overlimit transactions.

E-money generation technologies at first glance appear on balance to introduce more new risk than new assistance in managing operational risk. Open network technologies and the greater mobility of data over various communications media, especially telephone and other common carrier lines, create new points of entry into the system. The sheer volume of information being transmitted also can heighten risk in the sense that exposure to loss or corruption of the data is greater at any point in time than before. Offsetting these higher risks is better capacity to monitor and analyze transaction patterns and employ other computationally intensive approaches in the control process.

The fact that a transaction or activity is technology-based places focus on several key aspects of control. The first is, of course, access to the information system.[5] Electronic audit trails for individual records and systems, change controls

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[5]System access and other information security issues related to E-money are discussed in Bank for International Settlements, *Security of Electronic Money*, Report by the Committee on Payment and Settlmeent Systems and the Group of

for programs and systems being revised or introduced, and contingency backup, the availability and readiness of comparable systems in the event of system failure, round out the areas of key focus.

Operational Risk Measurement. The ability to measure operational risk is in its infancy when compared to measurement of market and even credit risk. The first step in developing good measures of operational risk is to measure the amount of financial exposure over the life of the process, starting with the process diagram that underlies the design of controls. A recent pathbreaking study by the Committee on Payments and Settlement Systems sponsored by the Bank for International Settlements provides a template for how such operational risk studies can be begun.[6] This study considers the nature, amount and timing of financial exposure in the settlement of foreign exchange transactions, an activity that includes exposure to both credit and operational risk. That such an approach can be highly revealing is reflected in the study's main conclusion that foreign exchange settlement exposure is generally two to three days in duration, overturning the widely held view that settlement risk in foreign exchange had a

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Computer Experts of the central banks of the Group of Ten countries, Basle, August 1996.

Bank for International Settlements, *Settlement Risk in Foreign Exchange Transactions*, Report prepared by the Committee on Payments and Settlement Systems of the central banks of the Group of Ten countries, Basle, March 1996.

maximum of about 16 hours.[7]

Most larger institutions have a good grasp of sound operational practices, but few have taken the first step of determining financial exposure, the amount of money at risk, in their operational processes. Thus, it appears that good measures of operational risk are some time away. Discussions with banks suggest that interest in developing such measures is growing. Such analyses of operational risk can help in assessing the risk-reduction value of enhancements to particular internal controls and to particular monitoring processes.

Operational Risk Monitoring. E-money generation technology makes the exposures and risks to be measured potentially more uncertain and thus increase the need for monitoring. Because a security threat can come from a much wider array of sources, avoiding problems largely through a set of preventive controls becomes more difficult. Since access cannot be limited with much certainty, the timing and extent of exposure become harder to estimate. A cyberthief or cybervandal could enter the system, and if undetected, observe for some time before striking, increasing the maximum damage potential.

In light of this uncertainty, it makes sense for banks to monitor their systems more aggressively and review the results of monitoring more often. Available monitoring systems can record attempts to break in, identify possible

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One indication of the significance of that finding is that capital is required against assets held for a day, such as overnight Fed funds, while none is required against foreign exchange settlement risk, in view of its "intraday" nature.

holes in the control framework, and detect unusual activity within the information system. Financial supervisors have an important role to play, both in encouraging banks to engage in a sufficiently high level of monitoring activity and in using industry-wide intelligence to identify potential vulnerabilities to attack.

Audit trails are an important adjunct to the monitoring process. As the financial records of financial firms are increasingly electronic, the history of the record need to be maintained electronically. If a supervisor detects possible alteration of electronic records, the original record can only be retrieved if the transaction history is long enough.

This need for monitoring is perhaps why supervisors have expressed considerable interest in the design of smart cards. The portability of the card raises issues about how frequently the card, once created, will interact with a monitoring process of the card's issuer or agent. The maintenance of records on the card's use--an audit trail--may be important in determining whether a card has been corrupted and where.

Supervisors will probably find it difficult to accept a smart card which can be used in a manner to avoid interaction with the monitoring system--such as a card capable of card-to-card transfers of value. Cash, of course, provides such transferability, but cash lacks durability and in volume, portability. Therefore, currency cannot avoid interaction with monitoring mechanisms such as currency counters indefinitely. Once card-to-card transfers are permitted to occur without

going through an "authorization" point subject to monitoring and maintainence of an audit trail, the potential exists for a fairly durable means to perpetuate fraudulent value once it is created.

The need for greater monitoring also applies to the quality of risk controls of major counterparties (both dealers and customers), as well as outside processors and information and software providers. Progressive firms are starting to monitor the operational performance of major counterparties--often starting with foreign exchange settlement.

Strategic Risk

The Nature of Strategic Risk. Strategic risk is the potential that underlying supply and demand conditions for the services the financial firm offers could develop adversely and reduce the value of the firm's franchise. Rapid technology change creates the potential exists for new competitors to reshape the product or to capture segments of the business.

Supervisory Concerns. Strategic risk raises supervisory concerns about management supervision and oversight. If technology is central to the strategic planning for the financial business at large financial institutions (no less integral than the scheduling and tracking systems of a Federal Express or a United Parcel Service), how familiar and how comfortable are senior management and the board of directors with technology? If developing the strategic plan should be a one-step

process rather than a two-step process of choosing a business strategy and then the technology to achieve it, can senior management develop the plan and the board review it?

At some firms, the answer is clearly yes. Some senior managements have placed technology at the center of their strategy, making the chief technology officer essentially the chief operating officer. Others have recognized that they do not possess the managerial skills or the willingness and ability to make the necessary capital investments to maintain a leading edge position in technology. These banks have exited certain business lines, such as the processing-intensive custody and trust businesses.

Many strategic plans, however, lack technological content. Strategic drift can erode long-run earning power and increase vulnerability to problems or downturns. Competition is reducing spreads in traditional and many newer financial businesses. Firms that face declining revenues or profitability in their customary markets will feel pressured to change strategy--to exit through sale to another bank or to enter new markets where risks are less well known. Major risks to the firm can arise if financial pressures are placed on business line managers that they cannot realistically meet.

Supervisors stress that managements of financial institutions develop and adhere to strong new products/new business policies. As financial firms enter the world of electronic commerce, their managements need to undertake a zero-based

review of risk management practices and internal controls. For example, how does one ensure compliance with the "know your customer" principle, one of the bedrock principles of credit risk management? How does one ensure adequate segregation of duties, a bedrock internal control principle, in an electronic environment, especially if technically skilled staff are in short supply?

Strategic risk also involves addressing the uncertainty in franchise value arising from a fluid competitive environment. Reducing the risk of eroding franchise value may lead to a strategy of business line diversification. It may also require reconsideration of the role of capital in the financial firm. Capital and liquidity not only form the ultimate buffer for the firm against adversity, capital and strong earnings may be necessary in order to finance investments in telecommunications and computers which may depreciate rapidly. The combined impact of these changes with the need for technical skills alters the relative competitive strength of banks vis a vis well-capitalized nonfinancial firms.

It therefore becomes all the more important for senior management and the board to monitor the value of the firm, its capitalization, and its strategic options. In a highly fluid environment, the routine maintenance of good contingency plans addressing options for raising capital and realizing value within the firm is well worth considering.

Compliance Risk

The Nature of Compliance Risk. Compliance risk is the possibility of conducting a business in a manner inconsistent with applicable laws and regulations and is often an issue for new financial products and services. The openness of the network system and the portability of the microchip creates uncertainty about the exact geographic coverage of the E-money or similar activities; the pressures to meet client needs in designing financial services may press against regulatory product definitions, in many cases designed several decades ago. The electronic nature of financial services and their delivery mechanisms often is not reflected in relevant laws or may run up against laws against cross-border transmission of personal information.

For internationally active firms, ensuring compliance with laws and regulations--as well as applicable supervisory guidance--represents a major control activity of the firm. Ensuring compliance requires mastering the relevant set of legal constraints and actively monitoring changing laws and standards around the globe. E-money technology simply adds to a staggering burden.

In discussions of E-money legal issues, the absence of specific laws governing E-money is often noted. From the firm's perspective, however, the concern may well the number of laws that could potentially apply, especially antiquated or inappropriate statutes which could be used to rectify perceived problems of safety and soundness, consumer protection or competitive equity.

Therefore, while compliance risk is a large and growing risk to firms, the real challenge is to the world's supervisors and legislative bodies to evaluate the amount of risk produced by the current structure.

Issues in International Supervisory Coordination

The concerns E-money and the related technological innovations raise are good examples of issues under discussion among international supervisors. Since the failure of Barings in February 1995, international supervisory coordination has become an issue of importance to the G-7 Heads of Government and a priority to international banking and securities regulators.

The Barings Problem. The Barings episode illustrated key problems in supervisory coordination; these problems are described in a 1995 report by the U.K. Board of Banking Supervision.[8] The roles and responsibilities of the home country supervisor, the Bank of England, and the Singaporean authorities with respect to oversight of Barings' Singapore futures trading business was unclear. Both supervisors' knowledge of the Singapore business was insufficient to interpret information they were receiving in the normal course of supervision or to make key supervisory decisions.

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[8]The events surrounding the collapse of Barings and its cause, as well as problems of supervisory coordination among regulators are described in *Report of the Board of Banking Supervision: Inquiry Into the Circumstances of the Collapse of Barings,* Return to an order of the Honourable the House of Commons, London, Her Majesty's Stationery Office, July 18, 1995.

Information-sharing was a particular problem. The Singaporean and Japanese exchange authorities possessed information which would have revealed inconsistencies in the explanations of Barings Singapore's activities if the information had been exchanged. Moreover, the information was not given to the Bank of England.

The Board of Banking Supervision's report raises additional questions about supervisory coordination in light of common firm management practices. The Barings organization, like many large, globally active financial institutions, practiced matrix management to control its global trading activities, assigning the Singapore futures trader reporting lines to both a global product head in London and a regional manager. In Barings, questions from Singapore were initially addressed to the local office and only much later to the head office in London. Barings management in London consisted of traditional bankers who admitted not understanding the futures business; since the Bank of England's contacts with Barings were through the London management, the Bank's understanding of the business was necessarily hampered. Baring's controls over this business were split between Singapore and London.

E-Money Related Supervisory Challenges. E-money generation technology affects four areas discussed in this paper--business line organization of the firm, management and control of operational risk, strategic direction and management oversight, and overlapping jurisdictions, laws and regulations--which are major

themes in the Barings episode and in the current discussion of enhancements to international supervisory coordination.

The issues begin with the changing internal organization of the firm. Rapid improvements in internal information systems permits firms to organize business lines with much greater flexibility, and increasingly, firms are choosing to organize along a small number of global business lines. The firm management structure and internal management reporting, including profit and loss reports, will be organized along these business lines.

As a result, the global business line structure is often only loosely connected to the legal entity structure on which regulatory jurisdiction for firm oversight is based. Since a host country supervisor's view is limited by jurisdiction, the host country supervisor may have only a very partial picture of business activities conducted locally; key risk management activities or internal control processes may be conducted outside the host supervisor's jurisdiction. Since the control process is only as strong as its weakest point, the supervisor may be unable to ascertain whether the overall controls are adequate.

Operational and systems risks are good examples of the types of risk that are difficult to monitor given such an organizational structure. Other types of risk --credit and market risks, for example--are frequently managed, monitored and controlled on a global basis, so that any evaluation of the capacity of risk management, much less its quality, can only be made by a supervisor with

perspective on the operations of the firm in its totality. Supervisory attention to the head office alone may not suffice, since, often enough, key business lines are managed globally from an overseas location. The ability of any supervisor to gain the necessary overview may be further limited if the firm does not have a consolidated supervisor, especially if significant elements of the firm--its holding company or major affiliates--are unregulated.

Similarly, the strategic pressures engendered by the rapid technological changes embodied in E-money are among many forces which subject firms to greater stresses. These stresses can surface suddenly, as the Barings case illustrates.

Supervisors would like to be better positioned to detect problems as they emerge and take preventive steps to contain spillover effects or market disruptions if necessary. Being able to respond quickly to a market disturbance appears to call for very good internal information at firms--for example, the ability to produce complete and timely information about exposures to individual markets and credit counterparties; to monitor settlements and funding and trading liquidity on a real-time basis, if necessary; and to communicate swiftly and effectively within the firm and with the outside world. How supervisors obtain, share as necessary, and make use of such information from firms raises important policy and logistical questions. If information-sharing arrangements can be put in place to cope with market or firm problems, they may provide a framework for considering

information-sharing necessary in more normal times.

The compliance risk issues raised by E-money represent the area where international supervisory coordination currently stops. The current discussion does not foresee major changes in the objectives and techniques of supervisory policy or a realignment of jurisdictions. It is worth noting that significant changes are underway in the supervisory approaches of many supervisors around the world as the work on international supervisory coordination is taking place. A variety of national efforts aim to increase the on-site presence of supervisors and/or the attention to risk management and internal controls (the Bank of England, the Bundesaufsichtsamt and the Bundesbank in Germany, the U.S. Securities and Exchange Commission and the U.S. banking regulators). International, interagency efforts are underway to increase the transparency of securities, futures and other clearing systems and to enhance risk management and internal control practices across a wide variety of firms.[9]

The Work of the Joint Forum. The Barings failure, among other events, led the G-7 Heads of Government to include in the communique issued in connection with the Halifax Summit in 1995 a call for closer collaboration between

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[9]These efforts are described in *Response of the Basle Committee on Banking Supervision and of the International Organization of Securities Commissioners to the Request of the G-7 Heads of Government at the June 1995 Halifax Summit*, Montreal, May 1996, and Tommaso Padoa-Schioppa, "Inter-agency Cooperation in Financial Supervision", speech before the III. Annual Conference of the International Association of Insurance Supervisors, Paris, October 14, 1996.

international banking and securities supervisors. The call was reiterated in the communique issued at the conclusion of the Lyons Summit in 1996, with a specific request for clearer definition of the roles and responsibilities of international supervisors.

The Joint Forum on Financial Conglomerates is a formal group made up of banking, securities and insurance supervisors belonging to the Basle Committee on Banking Supervision, the International Organization of Securities Commissioners and the International Association of Insurance Supervisors.[10] The Joint Forum has been charged with developing principles of supervision for financial conglomerates, and much of its work is currently directed at answering the concerns of the G-7 Heads of Government.

Currently, the Joint Forum is pursuing three lines of inquiry. The Joint Forum as a whole is developing a framework in which to analyze supervisory information sharing and coordination with respect to financial conglomerates and to develop principles of financial group supervision. To assist the Joint Forum in better understanding the impact of changing firm organizational structures and risk management techniques, the Joint Forum has established a Task Force on Mapping Conglomerates. A second task force is investigating several methods for

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[10]The Joint Forum succeeded an earlier, informal effort to identify issues in the supervision of financial conglomerates called the Tripartite Group of Banking, Insurance and Securities Regulators. The Joint Forum is chaired by Tom de Swaan of De Nederlandsche Bank, as was the earlier Tripartite Group.

assessing capital adequacy in financial conglomerates.

In seeking ways to enhance the supervision of financial conglomerates within the current supervisory structure, the Joint Forum must find approaches that will work for firms whether or not they have a consolidated supervisor. The need to develop a flexible framework to address different supervisory structures may be a benefit, given the potential for very far-reaching changes in the organization of financial services firms and the possibility that the boundaries between financial and technology and telecommunications firms may erode. Moreover, a flexible framework may also avoid sharp increases globally in expensive supervisory resources. The efforts of supervisors can and should be augmented by better internal information and controls at firms, more informative reporting to supervisors (not necessarily in mandated, common report forms), and, above all, improved public disclosures.

Improving internal reporting and public disclosures is no easy task. Meaningful evaluation of risk management and internal controls requires transaction testing and on-site review. The universe of transactions and controls from which to sample is huge in a large financial institution, and sound testing strategies need to be developed. Nonetheless, technology offers very significant potential for enhancing that testing, whether by internal auditors, external auditors or public sector supervisors.

A flexible framework for supervisory coordination provides perspective on

the question of whether a common international stance on the issuance of E-money by nonbanks is necessary. A flexible framework may involve sharing of supervisory information and greater public disclosure, with potentially more extensive disclosures for unregulated or lightly regulated E-money issuers.

International Monetary Policy Coordination

Innovation in basic forms of money could have significant ramifications for international financial activity, although that potential does not seem to come from retail E-money products. Such E-money is generally perceived to fill the role of cash, travellers checks and transaction deposits. As a practical matter, M1 types of money play a relatively small role in international capital flows. Investment flows are by sheer volume the driving force behind exchange rate movements and international influences on monetary policy.

What follows here is very speculative. The innovation of interest, the Internet, could in the longer run play a role as a common carrier of financial transaction information, a universal message-transmitter like SWIFT. Currently, a major component of international transaction deposits represents clearing balances and margin accounts for global investment activities financial dealers and institutional investors. The demand for money and collateral to meet clearing and settlement needs is substantial. As banks, securities firms, global investors and corporations conduct their financial activities around the globe and in a variety of

currencies, margin and settlement cash and collateral needs increases, along with the opportunities and incentives for efficiently managing cash and collateral.

Network money technology can facilitate more efficiency in clearance and settlement in three possible ways. First, improved information technology increases the scope for standardizing and shortening settlement times by allowing funds and financial instruments in electronic "book-entry" form to be exchanged quickly and easily across borders. Simpler, more standardized settlement approaches would enhance the ability to manage multicurrency portfolios.

Second, network technology also improves the ability to manage a single currency account globally in all time zones, which could encourage investors to seek to settle all transactions in their home currency. Contracts that transfer price based on one country's markets but are settled in another country's currency have existed for some time and become more common in recent years.

Finally, the ability to exchange claims electronically may raise basic questions about central settlement arrangements in general. One could conceive of a system in which the payment service provided by a bank or trust company dwindles to a recordkeeping function, and responsibility for the timing and monitoring of payments and settlements is assumed by many customers. Such changes could conceivably come from wider membership of dealers and institutional investors in existing clearing arrangements or a move toward more decentralized payment and clearance activity operating in parallel to existing

arrangements.

Efforts to understand settlement risk are likely to assist in any transformation, since those efforts may influence who bears different types of risk --financial firms or their customers. The cost of settlement services include not only measurable operational costs, but also generally less well-observed credit and liquidity services provided by these systems, as well as by providers of ancillary settlement arrangements, such as paying agents and domestic and global custodians. Custody services, for example, involves intraday funding and credit services. Most banks cannot readily quantify the value of these services, and the services are not generally explicitly factored into pricing. Currently, the impact of scale economies on marginal and average costs primarily drives pricing in custody.

More attention to comprehensive costs could change the pattern of financial transactions and financial holdings in ways that would have affect markets important to monetary policy operations. The reduction of clearing balances in some countries could lead to a significant reduction in the monetary base. The ability to cash settle in the home currency could reduce foreign exchange transaction volume and the need to hold cash assets in foreign currency. The cost and quality of central bank services and even the role of central banks could evolve substantially.

These trends accelerate the diminution of money as a share of overall financial activity and the separation of risk positioning from cash activity that has

been underway since the development of over the counter derivatives in the early 1980s. Central bank interests tend of necessity to widen as financial activity diversifies away from deposit banking. The increased coordination of central banks through the Committee on Payments and Settlement Systems of the BIS, and the Committee's increased collaboration with the International Organization of Securities Commissioners is consistent with that shift. Current reporting of domestic and international flows of funds are less meaningful in assessing build-ups of exposure in the international financial system, a problem being considered by the Eurocurrency Standing Committee sponsored by the Bank for International Settlements.

Conclusion

E-money generation technology has the potential to reshape further the competitive landscape in financial services, with effects on the internal reorganization of financial firms, on financial services in their current form, and on the strategic and operational risks of financial firms. For the international coordination of supervision, the issues raised by E-money technology are representative of the issues already challenging international supervisors to enhance information-sharing as well as coordination of activities. In the international coordination of monetary and payments policy, the most important influence of E-money technology is its potential for changing the cost of managing

payment and settlement-related risks for financial firms and for their customers. These changes in the first instance may bring about more explicit incorporation of the cost of credit and liquidity services in payment and settlement arrangements, and in the longer run reductions--or reduced growth--in the demand for cash and high-quality collateral.