

# The Eurocurrency Interbank Market: Potential for International Crises?

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## INTRODUCTION

The Eurocurrency interbank market plays a major role in channeling funds from lenders in one country to borrowers in another. It encompasses over 1,000 banks from 50 different countries, with a total market size of \$2.3 trillion.<sup>1</sup> Although transactions in U.S. dollars are the most prominent, there are flourishing interbank

markets in German marks, Swiss francs, Japanese yen, British sterling, French francs, and Dutch guilders.

Regulators and others have been concerned about the stability of this market largely because of the uncollateralized nature of the funds transferred, the "pyramiding" of deposits, and the low level of central bank regulation. These three factors expose the market to *potential* "contagion effects," where problems at one bank affect other banks in the market and ultimately threaten the market's stability and its functioning. Therefore, it is important to try to determine whether contagion effects really are a threat, and, if they are, what the appropriate regulatory response should

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<sup>1</sup>For more quantitative details on this market, see *Bank for International Settlements Quarterly Reports*, various issues.

be. In addressing this issue, the first step is to understand how the market works, what the risks are, and how the risks may be transmitted. The next step is to analyze how the market has behaved in the face of major financial crises, such as the international debt problem or the failure of a large international bank.

### THE EUROCURRENCY INTERBANK MARKET

The Eurocurrency interbank market provides at least four interrelated functions. The first is a distribution function; it is an efficient market system through which funds owned by corporations or large wealth holders in one country are transferred to similar organizations in other countries for their ultimate use in investment and consumption. As of September 1985, such cross-border interbank claims stood at \$1.4 trillion, or about 60 percent of the total market. The second is a hedging function, with the Eurocurrency interbank markets providing an efficient mechanism for banks to buy and sell foreign currency assets and liabilities of different maturities so as to manage (or hedge) their exposure to interest rate and foreign exchange risk. Third, these markets are a convenient source of borrowed funds when banks need to adjust their balance sheets either domestically or internationally. Fourth is a regulatory avoidance function, that is, avoiding regulation on capital adequacy and interest rates prevalent in many domestic banking markets such as the U.S.

Of the four functions, the first—the role of the interbank market in moving funds from one country to another—is probably the most important. These transfers of funds are generally executed electronically over the Clearing House Interbank Payments System (CHIPS). The interbank market links lenders in one country to borrowers in another, which can be viewed as *international financial intermediation*. The alternative is direct financial transactions between lenders in one country and borrowers in another country, such as the issuance and direct sale of bonds and equities across national boundaries,

which can be viewed as *international securitization*.

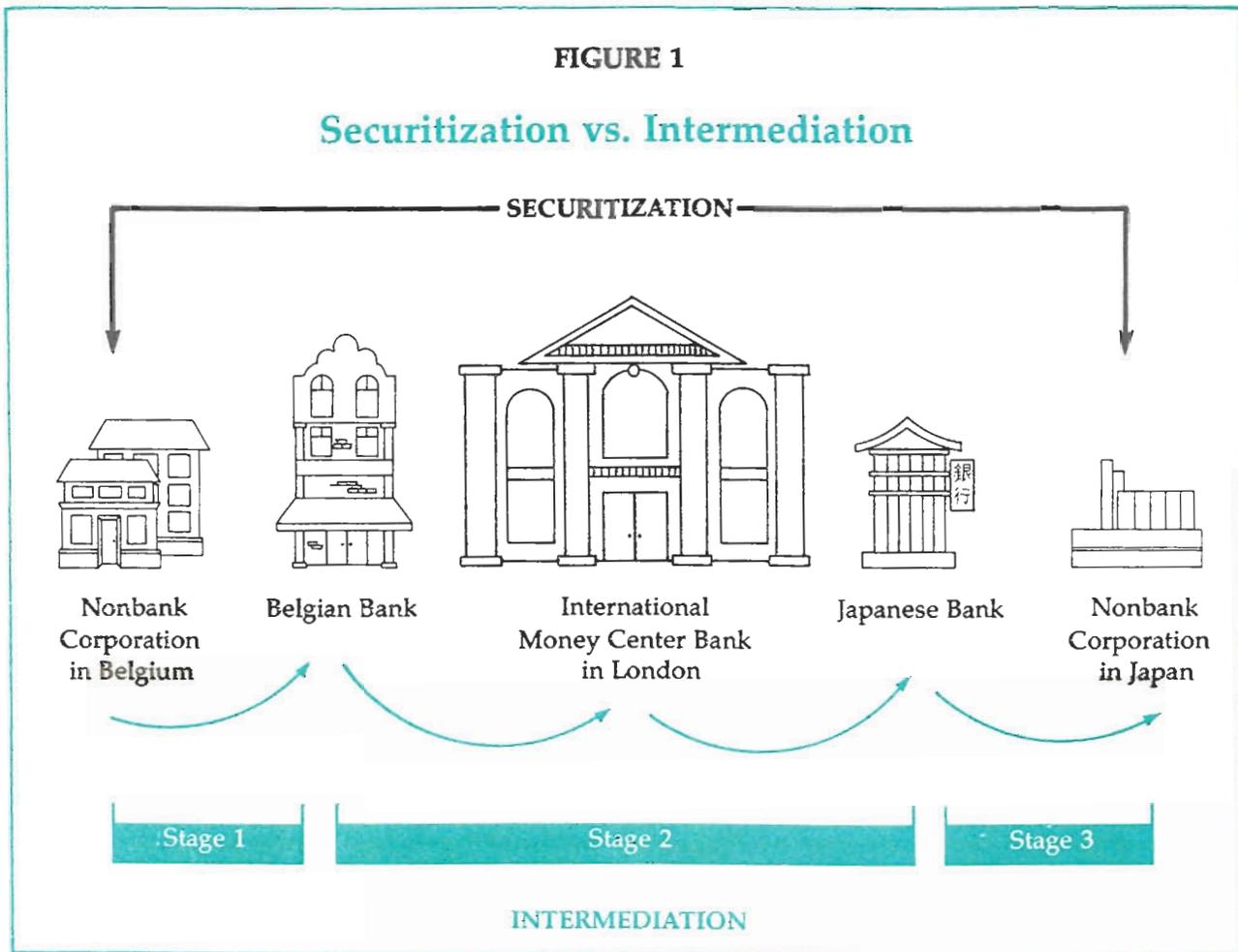
To see the differences between these two mechanisms of financial transfer, consider Figure 1, which illustrates a simple hypothetical case using Belgium and Japan. Suppose in Belgium a corporation with surplus funds seeks an investment outlet, while in Japan another corporation needs additional funds to meet its investment objectives. International securitization might involve the Japanese corporation issuing additional debt or equity and selling it to the Belgian corporation in return for cash funds. While this process is direct, it is also likely to be relatively costly. Principally because of geography and location, it will be very expensive for the Belgian corporation to collect information and to monitor continuously the actions of the Japanese corporation once the money is lent.

An alternative process would be to transfer funds through international financial intermediation. In general, while this process is indirect and involves three (or more) transaction stages, it will often involve relatively less in the way of information and monitoring costs.

In Stage 1, the Belgian corporation deposits funds with its local Belgian bank. Normally, the Belgian corporation and bank already have developed a close customer relationship over time, so that the information (and search) costs relating to this transaction will be relatively low.

Stage 2 is the interbank market transaction between the Belgian bank and a bank in a major financial center such as London. Perhaps because of the absence of profitable domestic investment opportunities in Belgium, the Belgian bank redeposits the money with the international money center bank. In turn, the large international money center bank, known as a Eurobank, will immediately resell these funds to another bank, often one operating in another country (in this case Japan). In essence, the large bank located in the banking center acts as an interbank deposit broker to match up the supply and demand for deposits internationally.

In Stage 3, the Japanese bank then lends these funds to a local Japanese corporation. As in Stage



1, the local bank and corporate loan customer in **Japan probably** have developed a close relationship over time, materially resolving any underlying information and monitoring problems between the contracting parties.

Consequently, whether international intermediation takes place rather than a direct security transaction depends on the *relative costs* or risks of the two processes. Specifically, if interbank transactions become relatively less risky than international **securitization**, then international financial **intermediation will** tend to be the principal mechanism of international funds transfer.

**RISKS IN THE INTERBANK MARKET AND CONTAGION EFFECTS**

What are the risks involved in the inter-

mediation process and how serious are they compared to direct transfers of securities? At least five different risks can be delineated for an individual bank participant:

1. Credit (default) Risk: the risk that a borrowing bank or corporation may default (not repay) an interbank loan. Credit risk is important since such loans and deposits are uncollateralized, and monitoring the ability of the borrower to repay will be less than perfect.

2. Liquidity Risk: the risk of a sudden withdrawal of interbank deposits by other banks. In this case, the bank has to sell off relatively **illiquid** assets (possibly for less than their face value) to meet any subsequent deposit drain.

3. Sovereign Risk: the risk of a foreign country preventing its banks from repaying loans or

deposits received from banks in other countries (as, for example, Cuba did after the revolution in 1961).

4. Foreign Exchange Risk: the risk of an adverse change in a foreign exchange rate if the bank's interbank assets and liabilities in each currency are not balanced. In this case conversion of yen assets and liabilities into dollars, for example, would realize capital losses to the bank.

5. Settlement or Daylight Overdraft Risk: the risk of a breakdown or non-settlement on the major wire-transfer systems, such as CHIPS. Since funds messages transferred during the day are not actually settled until the end of the day, sudden fund shortages at the end of a day may prevent a bank making good its message transfers. Thus, settlement risk is a form of off-balance sheet "credit risk" faced by participants in the interbank market.

In principle, firms or individuals engaged in direct security transactions (international securitization) are likely to face four of these five risks, the exception being settlement risk. For example, firms confront the risk of default by customers; they face liquidity and interest rate risks whenever they hold long-term assets but shorter term liabilities; they may have assets frozen by foreign governments; and they may be harmed by adverse exchange rate movements. To the extent that banks can better manage, monitor, and hedge these risks than individual firms and wealth holders, international intermediation is more likely to dominate international securitization.<sup>2</sup>

**Contagion Effects.** At the individual bank level, each of these risks may be very serious—serious enough to lead to a bank's failure. While this is obviously costly for the individual bank, it might appear that at the market level the cost is small, especially if there are many other banks in the system. But in terms of market stability, there

may be extremely large costs if bank failures and risk problems are translated from the individual bank into systematic *contagion effects*. Contagion effects occur when problems at one bank are perceived to have direct and adverse impacts on the operations and solvency of *other* banks in the interbank market. There are two mechanisms or channels through which contagion effects may lead to a full-scale crisis: information channels and institutional channels.

*Information Channels.* Information contagion effects themselves can be divided into pure information contagion and "noisy" contagion. In the case of pure information contagion, a bank fails for reasons particular to that bank, such as fraud, and the announcement of this failure undermines confidence regarding the safety and soundness of *other* banks. For example, regulators may have allowed losses to build up by failing to close a fraudulent bank on a timely basis, which may lead depositors to revise their expectations regarding the safety of deposits in general.

In the case of "noisy" contagion, depositors or investors have imperfect information regarding activities engaged in by all banks. For example, an announced loss by one bank on its foreign currency dealings, or a cut in its dividend due to loan-loss write-offs, may be seen as a noisy, but systematic, signal about the condition of other banks. As a result, those banks will lose some public confidence and will be placed in a similar risk-class as the troubled bank.

*Institutional Channels.* There are at least two institutional channels through which individual bank risk can be transmitted to other banks. The first is the real transmission of bank runs to other banks; that is, a run on an individual bank in the interbank market can turn into a systemic bank run due to the close "pyramiding" of interbank transactions. For example, a run on bank A will drain deposits from this bank; however, bank A may be a net creditor, or supplier of funds, to a large subset of banks. Thus, bank A may call in its deposits from banks B, C, and D in an attempt to cover its position. Such calls may lead to liquidity

<sup>2</sup>Another reason why the existence of interbank markets may mitigate bank insolvency risk is that these markets allow greater asset and liability diversification compared to a world where banks are constrained to taking deposits from and making loans to nonbanks only.

problems for these banks, which in turn have to call in their deposits with banks E, F, and G, and so on. It might be argued that a system-wide collapse cannot occur because funds withdrawn from these banks are simply redeposited elsewhere in the system. In reality, however, deposits can be switched out of the interbank market and back into domestic banking, or, in a true "flight for quality," into domestic Treasury securities. Thus, with each bank trying to meet a funds shortfall through calling in deposits with other banks, systematic run problems can occur.

The second institutional mechanism through which individual bank risk may be transmitted to other banks is through settlement risk. Under the current system, interbank transactions that take place during the day are not actually settled or made good until the end of the day. At that time, participating banks transfer funds into and out of the accounts at the Federal Reserve Bank of New York either directly or indirectly through a correspondent via CHIPS. If bank A cannot meet its settlement commitments at the end of the day, CHIPS resolves this by completely unwinding bank A's whole daily position (their message transactions) with all other banks. That is, this bank would have its transactions with all other banks expunged for that day. As a result those banks that were net senders (suppliers) of funds to bank A—that is, they sent more than they received—would have their net settlement positions improved, while those banks that were net receivers of funds from bank A would have their positions worsened. Consequently, some banks that were originally in a net creditor position may be forced into a net debtor position, while others would have their net debtor position worsened. If some of these banks then are unable to meet their revised settlement requirements, a further rebalancing would be necessary, and so on until all the banks that are left could meet their settlement obligations.<sup>3</sup>

<sup>3</sup>It might be noted that if settlement failure occurred domestically (on the fed funds wire transfer system), bank participants would not lose since the Federal Reserve guarantees that the funds are "good funds" at the time the

## LOOKING FOR ACTUAL CONTAGION EFFECTS IN THE INTERBANK MARKET

Whatever the mechanism of transmission, a contagion effect will tend to have adverse financial effects on all the related banks in the interbank market. Theoretically, at least, four different financial effects on related banks are possible. First, banks may require higher risk premiums to lend unsecured funds to other banks on the interbank market; this would tend to raise their rates higher than the current market interest rate for the lowest risk interbank transactions, called LIBOR (the London Interbank Offer Rate). That is, it would increase the spread over LIBOR. Second, depositors may seek to withdraw funds from other banks in the interbank market effectively causing multiple bank runs. Third, the actual quantity of funds lent on the interbank market may fall. That is, the risk premium may be insufficient to compensate lenders for some interbank loans, who may react by restricting or *credit rationing* potential borrowers. Fourth, investors in bank stocks in the capital market may require higher returns to hold bank equity in their portfolios.<sup>4</sup> What evidence do we have on these effects?

**Risk Premiums.** Evidence on risk premiums is difficult to obtain for individual banks. At best, researchers have to observe bid (or buy) quotes by actually watching moment-to-moment developments on the screens of financial newswires such as Reuters. In a recent paper, I. H. Giddy reports the results of looking at day-to-day changes for 30 Eurobanks in London in 1981.<sup>5</sup>

message transfer occurs. That is, the Federal Reserve directly bears the settlement risk. For further details on this, see Richard L. Smoot, "Billion Dollar Overdrafts: A Payments Risk Challenge," this *Business Review* (January/February 1985) pp. 3-13.

<sup>4</sup>For a full discussion of the models underlying this discussion, see Anthony Saunders, "The Determinants of Country Risk: A Selective Survey of the Literature," *Studies in Banking and Finance* (Supplement to the *Journal of Banking and Finance*) 3 (1986) pp. 1-38.

<sup>5</sup>See I. H. Giddy, "Risk and Return in the Eurocurrency Interbank Market," *Greek Economic Review* (1981) pp. 158-186.

Estimating deviations from the average on a typical day, he found the range of quotes to be quite small—at 5/16 of a percent, or 30 basis points. These differences could not be accounted for by the possible riskiness of the borrower, and Giddy therefore concluded that the small spreads tended to reflect the relative daily demand for funds at individual banks.

The vast majority of other studies have looked not at individual banks, but at average risk premiums among all banks and other borrowers from a given country or jurisdiction. Thus, these studies have focused on the degree to which sovereign risk accounts for differences in risk premiums. In this context, Saunders grouped countries according to their riskiness and analyzed indices of interest rate spreads (risk premiums) over LIBOR in the Eurocurrency markets.<sup>6</sup> The first group, the industrialized countries, such as the U.S., are considered the “safest.” The second group, marked by upper-middle incomes, such as Yugoslavia, are somewhat more risky. The third group, the riskiest, consist of the less developed countries (LDCs), such as in Latin America and Eastern Europe. Of particular interest was how correlations among these countries’ risk premiums behaved around the time of the international debt crisis of fall 1982, a crisis that directly involved Mexico and Brazil. If correlations are low, then it means contagion was absent. If correlations are high, then contagion was present. The study found that the correlation between the industrialized group and the LDCs was very low, close to zero in 1981, but that it rose, to +.50, at the time of the debt crisis in the autumn of 1982. By April 1983, however, this correlation had declined again to +.25. This suggests that a temporary contagion effect existed around the time of the crisis announcement, which dissipated soon after the shock.

Numerous other studies have tried to model

<sup>6</sup>See Anthony Saunders, “An Examination of the Contagion Effects in the International Loan Market,” *Studies in Banking and Finance* (Supplement to the *Journal of Banking and Finance*) 3 (1986) pp. 219-248.

the determinants of sovereign risk using other statistical techniques.<sup>7</sup> Presumably, if lenders can distinguish among sovereign risks, they can accurately discriminate between high-risk and low-risk countries and demand risk premiums accordingly. But, in a world of contagion, lenders are not discriminating, so these models should fail to fit risk premiums to sovereign risk. Using what is called a discriminant analysis model, Richard Taffler and B. Abassi conducted tests to evaluate how well the model explained 71 known debt reschedulings between 1979 and 1983.<sup>8</sup> On the whole, their model appears to have performed reasonably well, predicting 69 percent of the reschedulings, but it failed to predict the 1982 Mexican debt crisis.

Overall, it appears that apart from the months immediately surrounding major crises, such as the Mexican debt announcement, risk premiums have not reflected contagion effects. It is possible, however, that contagion effects may be reflected in elements other than the prices (the spreads) lenders demand. Instead, contagion may lead to a crunch in the supply of loans—either because bank runs have drained lenders of their deposits, or because lenders are less willing to extend credit because of the perceived risk.

**Bank Runs.** The theory of bank runs has received considerable attention in the recent literature, although most of the research has focused on historical banking panics in the U.S. Such historical evidence, however, provides

<sup>7</sup>For a review of this literature, see Donald McDonald, “Debt Capacity and Developing Country Borrowing: A Survey of the Literature,” *IMF Staff Papers* (1982) pp. 603-646, and Anthony Saunders, “The Determinants . . .”

<sup>8</sup>See Richard Taffler and B. Abassi, “Country Risk: A Model for Predicting Debt Servicing Problems in Developing Countries,” *Journal of the Royal Statistical Society (Series A)* (1984) pp. 541-568. The discriminant analysis approach divides banks into two groups, reschedulers and nonreschedulers, and tries to identify the key economic variables that led to countries being placed in each of these groups. Once the key variables and their relative importance are statistically derived, this discriminant function is used to predict the likelihood of countries having to reschedule in the future, given current values of the set of economic variables entering the discriminant function.

some insights into the likelihood of systematic panics in the current international interbank market. In a recent paper, Michael Bordo matched common international business cycles for the U.S., Great Britain, Germany, France, Sweden, and Canada between 1870 and 1933.<sup>9</sup> While bank panics appeared to be major determinants of 7 out of 12 contractions experienced in the U.S. over this period, such panics were noticeably absent in the contractionary phases for the five other countries. For example, no banking crisis occurred in any of the 12 contractions in Great Britain. Bordo attributes the greater prevalence of panics in the U.S. to two factors: the pyramiding of regional deposits with New York banks compared to the more geographically diversified deposit bases developed by non-U.S. banks, and stronger and more active central banks in non-U.S. countries.

To draw the comparison with today's international interbank market, there are some similarities and some differences. On the negative side, the extensive pyramiding of deposits today at a small number of central money market banks is analogous to the pyramiding at the New York banks in the 1870-1933 period.<sup>10</sup> However, mitigating against panic effects is the greater diversification of funding sources of today's international banks, more active market intervention (in the form of examination and surveillance) and implicit guarantees provided by central banks, and the existence of relatively flexible exchange rates which weaken the transmission effect of individual country shocks.

In the more recent era, the "failure" of Continental Illinois in April 1984 provides a good case study for analyzing any systematic effects of bank runs both domestically and internationally. At the time of its failure, Continental Illinois

was the eighth largest bank in the U.S. It had assets of \$42 billion, 75 percent of which were financed by rate-sensitive liabilities, which fluctuate directly with changes in market rates. More importantly, Continental Illinois relied heavily on foreign interbank deposits, amounting to 53 percent of its rate-sensitive liabilities, as well as on domestic interbank deposits, amounting to 21 percent of its rate-sensitive liabilities. Less than 10 percent of its deposits were guaranteed by FDIC insurance.

Two important dates for analyzing run and contagion effects were April 18, 1984, when Continental Illinois announced an increase of \$400 million in its problem loan portfolio, and May 10, 1984, when the Comptroller of the Currency publicly "denied" rumors that Continental Illinois was in serious financial trouble. The April 18 announcement had an imperceptible effect on large bank deposit flows—large banks' so-called purchased funds (such as large CDs) increased by 1 percent that week. The May 10 announcement, however, appears at first sight to have had a more serious effect, with purchased funds declining by 7 percent (or \$13 billion) over the announcement week. But this decline was largely offset by an 8 percent increase in demand deposits in the same week.<sup>11</sup> Thus, many depositors such as small regional banks appear to have reacted to the crisis simply by switching funds into safer banks and more secure deposits rather than by "running." That is, there was virtually no contagion effect on other "safe" banks. While large depositors may have perceived that "implicit" Fed guarantees applied to their deposits in the U.S., it was not obvious that these guarantees extended to the *overseas or offshore* offices of U.S. banks operating in the Eurocurrency markets. However, figures from the *Bank of England Quarterly Bulletin* show that in neither April nor May was there a net decline in

<sup>9</sup>See Michael O. Bordo, "Some Historical Evidence on the Impact and International Transmission of Financial Crises, 1870-1933," NBER Working Paper No. 1606 (1985).

<sup>10</sup>However, the creation of the Federal Reserve and the imposition of reserve requirements has limited this analogy somewhat.

<sup>11</sup>The figures are based on results found in Itzhak Swary, "The Stock Market Reaction to Regulatory Action in the Continental Illinois Crisis," *Journal of Business* (1986) pp. 451-473.

to signal to the market that large bank failures will not be allowed to occur, or that if they do occur, they will not be allowed to affect large depositors.<sup>18</sup>

Regulatory intervention, in turn, has raised questions regarding the "price" of such guarantees. For example, if banks operating in the interbank market view such guarantees as a "free good," then various incentives for banks to take increased risk could arise. Indeed, such problems have long been recognized in the context of U.S. deposit insurance, where the FDIC charges banks fixed premiums that are independent of bank risk.<sup>19</sup> This has created incentives for banks to overexpose themselves in risky loans and to economize on "costly" monitoring and information collection. As a result, while the financial system may be more stable in the short run, longer term instability problems may be built in.

In actual practice, banks currently operating in the international interbank market appear to be charged a varying set of *implicit* fees in return for central bank guarantees, in addition to basic domestic supervision and regulation (such as reserve requirements). First, virtually all international banks have had to face increased mandatory disclosure requirements since 1982. As disclosure is costly for the bank but, presumably, beneficial to outsiders, such as regulators, investors, and depositors, it can be viewed as a

form of regulatory tax. Second, in January 1987 the Federal Reserve released new proposals for risk-based capital guidelines jointly developed with the Bank of England.<sup>20</sup> The guidelines link capital adequacy ratios to credit risk exposure both on and off the balance sheet and propose that such ratios should eventually be made uniform across countries. Third, there have been some moves towards implicitly pricing daylight overdrafts by calling for banks to limit the size of daylight overdrafts they will accept from other banks. These limits are known as net debit caps, and are based on the perceived creditworthiness of the borrower.

Unfortunately, it is far from clear whether this patchwork of implicit controls will suffice to price and mitigate bank risk as the interbank market evolves. At least *two* additional important reforms might be considered that relate directly to controlling the daylight overdraft risk of CHIPS, which poses the most potent institutional contagion threat. Such reforms might be necessary since daylight overdraft risk problems are unlikely to be resolved either by the proposed risk-based capital requirements scheme (which ignores electronic wire system risks) or by net debit caps.<sup>21</sup> The first reform would be to settle interbank CHIPS transactions at various times during the day, so as to avoid grouping all settlements at the end of the day as at present. The feasibility of this reform, however, depends upon making significant technological improvements to the current network. The second reform requires *explicitly* pricing daylight overdrafts, since such overdrafts essentially pose the same

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<sup>18</sup>For example, in testimony before the House Banking Committee in September 1984, the U.S. Comptroller of the Currency stated that regulators would actually prevent the failure of the 11 largest banking organizations in the U.S.

The failure of Banco Ambrosiano, an Italian bank, identified a loophole, however, in the global responsibility concept. Since the Luxembourg subsidiary of Banco Ambrosiano was classified as a nonbank holding company rather than as a bank, the Bank of Italy refused to take direct responsibility. See J. Guttentag and R. Herring, "Funding Risk in the International Interbank Market," Working Paper, The Wharton School, University of Pennsylvania (1985).

<sup>19</sup>For a review of this literature, see John J. Merrick, Jr. and Anthony Saunders, "Bank Regulation and Monetary Policy," *Journal of Money, Credit and Banking* (1985) Part 2, pp. 691-717.

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<sup>20</sup>For a more detailed discussion of the proposed guidelines, see Janice M. Moulton, "New Guidelines for Bank Capital: An Attempt to Reflect Risk," this *Business Review* (July/August 1987) pp. 19-33.

<sup>21</sup>For example, in the case of voluntary net debit caps, banks that are in trouble are likely to try to ignore any voluntary or "self-imposed" requirements. Under such circumstances they may be successful, unless operators of the wire systems continuously monitor each bank's position so that messages that breach a bank's daily cap can be rejected.

kind of credit risk problems to banks as regular overdrafts.

As the market for international banking services grows and banks increase their global orientation, the potential for a major crisis in the international banking system will remain. However, a combination of increased disclosure, internationally uniform risk-based capital

requirements, clearly defined central bank responsibilities towards problem banks, more frequent settlement, and explicit pricing of daylight overdrafts would appear to offer a flexible framework to insulate the international interbank market against any potentially disruptive failures of large international banks in the future.