

Reducing the Costs and Risks of Trading Foreign Exchange

*Brian J. Cody**

A U.S. exporter who has received Deutsche marks from a German firm wants to exchange his mark receipts for dollars. A chief financial officer of a U.S. corporation wants to purchase Spanish pesetas in order to buy corporate stock on the Madrid stock market. A foreign exchange speculator wants to increase his holdings of French francs because he believes that the franc's value will appreciate in the near future.

Thousands of trades like these generate the business that underlies the enormous flow of funds each day between institutions participating in the foreign exchange market. The volume of global foreign exchange trading has doubled in the last three years, according to surveys by the Bank of England, the Federal Reserve Bank of New York, and other central banks. The surveys estimate the average daily turnover in the New York market as of April 1989 at \$129 billion, up 120 percent compared to March 1986. This daily turnover is roughly 21 times the average daily value of stocks traded on the New York Stock Exchange in 1989.

*Brian J. Cody is a Senior Economist in the Macroeconomics Section of the Research Department, Federal Reserve Bank of Philadelphia.

This enormous volume of foreign exchange contracts is arranged between foreign exchange brokers and traders at financial and nonfinancial institutions throughout the world. The volume reflects a wide variety of transactions involving flows of international capital and goods.

To market participants, however, these transactions involve costs and financial risks. Accordingly, private financial institutions, as well as the world's central banks, have been studying payment arrangements that allow netting of transactions between institutions. Netting will undoubtedly cut the transaction costs of foreign exchange trading. More important, if properly implemented, netting arrangements should both reduce credit and liquidity risks to all participating financial institutions and enhance the soundness of the entire payments system.

BILATERAL NETTING ARRANGEMENTS

The basic idea behind netting arrangements is simple. Consider two friends who owe each other money. The debts could be settled by each friend paying the other the full amount owed. However, the friends could save on their transaction costs if the one owing more money simply subtracted the amount owed to her and paid the net amount to her friend.

Each day, individual banks and other financial institutions engage in hundreds of trades in the foreign exchange market. Like the two friends, these institutions are reducing their transaction costs by netting their foreign exchange payments. The only difference is that, because each institution arranges hundreds of transactions in all the major currencies in a single day, the potential savings are much larger.

Consider three banks with foreign exchange departments: Rhinebank, Floyds, and Countibank. On a particular Monday, the institutions have arranged a total of eight transactions in the spot foreign exchange market.¹ Each interbank transaction involves the exchange of one

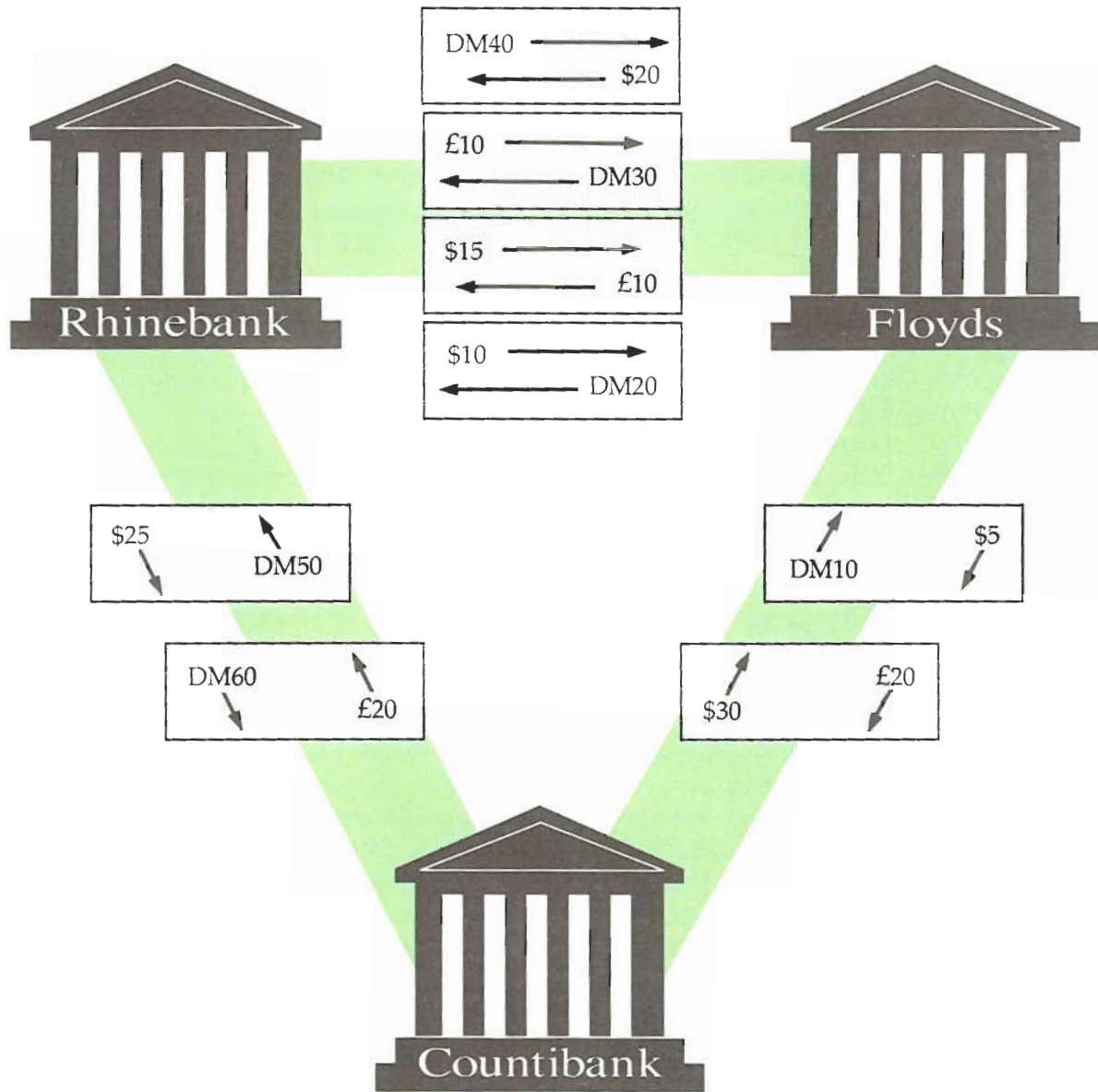
currency for another. These transfers could be generated by the flow of goods (exporters selling foreign exchange receipts), financial instruments (a firm buying foreign securities), or exchange rate speculation (speculators betting on exchange rate movements).

Figure 1 depicts the spot foreign exchange transactions occurring between Rhinebank, Floyds, and Countibank. Rhinebank and Floyds engage in four transactions with each other—twice trading Deutsche marks (DMs) for dollars, once trading dollars for pounds sterling (£s), and once trading £s for DMs. Countibank engages in a total of four transactions, two each with Rhinebank and Floyds.

When these obligations are settled, Rhinebank will process 12 transactions, making four payments to Floyds and two to Countibank—one for each foreign exchange contract—and receiving as many payments from each. Floyds would also process 12 transactions. Since it had arranged four contracts, Countibank would process eight transactions. If they were to adopt a netting arrangement, these three banks could cut their transaction costs (the back-office expenses of processing the trades, as well as a per-item charge on payment messages sent over the wire-transfer network) by reducing the number of payments and receipts they have to process on any particular day.

¹Spot foreign exchange settlements typically occur two business days from the trade date. The New York Fed's foreign exchange survey reports that spot transactions accounted for 63.9 percent of all foreign exchange trading reported by New York banks in April 1989. Foreign exchange swaps, forward contracts, options, and futures accounted for the remaining portion. For complete results, see "Summary of Results of U.S. Foreign Exchange Market Survey Conducted in April 1989," Federal Reserve Bank of New York, September 13, 1989; "The Market for Foreign Exchange in London," Bank of England *Quarterly Bulletin* (November 1989) pp. 531-35; and "Survey of Foreign Exchange Market Activity," Bank for International Settlements, Monetary and Economic Department (February 1990).

FIGURE 1
Sample Set of Foreign Exchange Transactions



Total Transactions = 16

Note: All exchange rates are hypothetical examples.

The simplest type of netting that could be arranged among the banks is *bilateral netting*. In a bilateral arrangement, two institutions agree, either informally or in a legal contract, to net the currency payments due to the other on a particular day. After netting, only one payment in each currency is due to or received from each counterparty on each day. Figure 2 presents the payments flows that result from a series of bilateral netting arrangements between Rhinebank, Floyds, and Countibank.

With bilateral netting, the number of transactions falls considerably, by 50 percent in this example. Bilateral arrangements tend to benefit institutions that engage in a large number of transactions with a particular counterparty or trading partner. For example, Countibank, though its transaction costs are reduced, does not benefit as much as the other banks because it engages in only half as many transactions with Rhinebank and Floyds as these banks do between themselves.

The most tangible benefit of bilateral netting to these institutions is the reduction in transaction costs. However, banks also incur additional costs in the form of additional risk, because there is typically a delay of two business days between the time when a trade is arranged and the moment when the currencies actually change hands. This lag exposes institutions to the risk that their expected foreign exchange receipts will be delayed more than two days or might never be received. What's more, it is typical for payments to be made at the beginning of the delivery day in one currency before other funds are received later in that day in another currency.² Netting can

reduce an institution's exposure to this risk. In fact, bilateral netting can provide several risk-reduction benefits.

Liquidity risk is the risk that although the debtor will eventually make good on his obligation, he will not make payment on time because of a temporary lack of funds in terms of one or more currencies. Bilateral netting agreements unambiguously reduce exposure to liquidity risk in the foreign exchange market. Before netting, Floyds faced the liquidity risk that Rhinebank would not be able to pay the US\$25 million it owed. After netting, Rhinebank would owe only US\$5 million on net to Floyds, substantially reducing Floyds' liquidity risk.

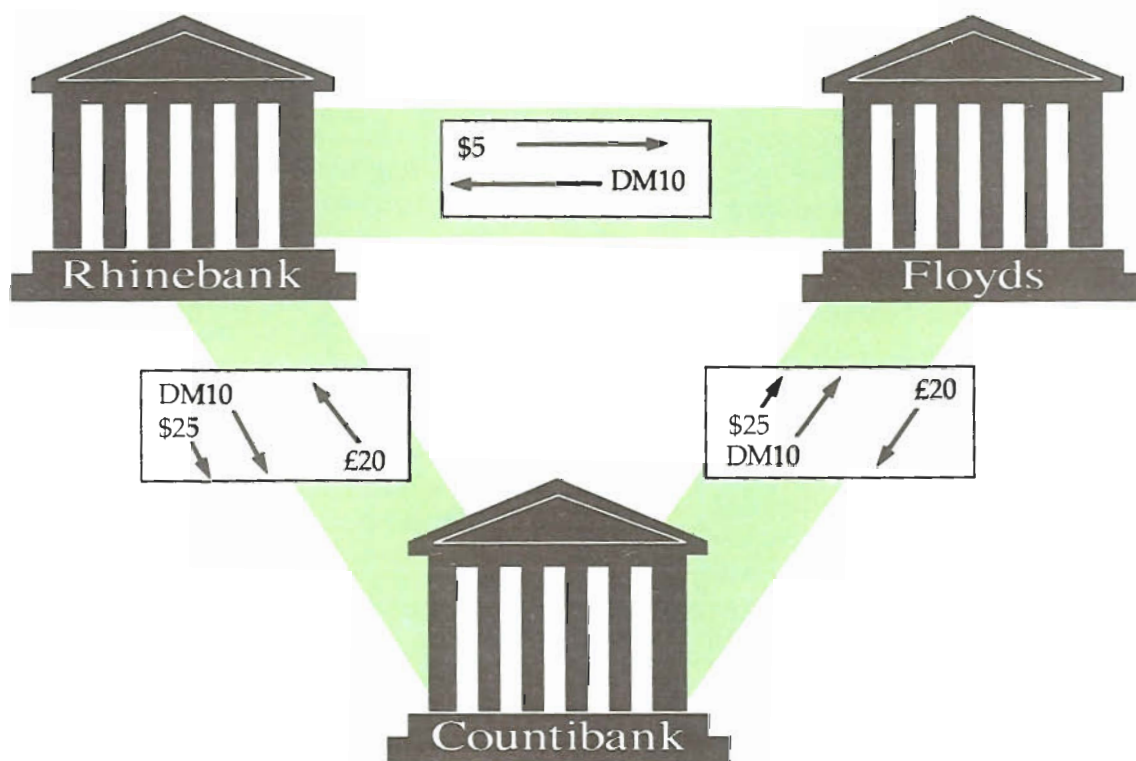
Credit risk is the risk that a debtor will default on his obligation, never paying the creditor. For instance, Floyds faces credit risk because there is a chance that, between the time its deals with Rhinebank are arranged and the actual exchanges occur, Rhinebank will declare bankruptcy and default on its obligations. Credit exposure, which equals total expected foreign exchange receipts, is one measure of the credit risk borne by an institution. Figure 2 shows the dollar amount of each bank's apparent credit exposure in the three currencies before and after bilateral netting. Whether a bilateral netting arrangement reduces the participants' actual credit exposure depends on how the banks view the netted payments.

If the gross foreign exchange obligations—the individual foreign exchange contracts—are not legally satisfied until final payment is actually made, then the banks are said to be engaged in *bilateral payments netting*.³ This arrangement leaves an institution's credit exposure unchanged

²Other terms are sometimes used to describe aspects of credit risk, such as "settlement risk," which can contain elements of credit and liquidity risk, and "replacement cost risk." For a more detailed discussion, see "Report on Netting Schemes," Group of Experts on Payments Systems of the Central Banks of the Group of Ten Countries, Bank for International Settlements (February 1989).

³Payment netting can be either an informal or a formal agreement to net the amount of the gross liabilities. The formal agreement, which is legally binding, is known as *binding payments netting*. In both cases, the parties remain legally bound for the gross transactions, not the net amounts.

FIGURE 2
Payments and Receipts with Bilateral Netting



TOTAL TRANSACTIONS = 8

Credit Exposure from Gross Obligations

	Total Expected Receipts			Converted to Dollars (DM2 = US\$1, US\$1.5 = £1)
	US\$	DM	£	
Rhinebank	20	100	30	115
Floyds	55	50	10	95
Countibank	30	60	20	95

Credit Exposure, Bilateral Netting (by Novation)

	Total Expected Receipts			Converted to Dollars (DM2 = US\$1, US\$1.5 = £1)
	US\$	DM	£	
Rhinebank	0	10	20	35
Floyds	30	10	0	35
Countibank	25	10	20	60

because, if one party were to default, the netting agreement would dissolve back into agreements in terms of gross, not netted, obligations. Reconsider Rhinebank and Floyds. On net, Floyds expects to receive an equivalent of \$35 million from Rhinebank and Countibank. Floyds' credit exposure would appear to have fallen to \$35 million from an original exposure of \$95 million. If Rhinebank were to declare bankruptcy before Wednesday's payments were made, Floyds would be legally bound to its gross obligations with Rhinebank. It would have to pay Rhinebank US\$20 million, DM30 million, and £10 million. With regard to Rhinebank's gross obligations to Floyds, however, Floyds would become just another unsecured creditor to the failed institution and would probably not receive complete payment for the gross amounts owed by Rhinebank.⁴

In fact, there is a danger that bilateral payments netting could actually *increase* credit risk if an institution were mistakenly to treat its net obligations, rather than its underlying gross positions, as the measure of its true credit exposure. Institutions routinely set limits on the credit exposure they are willing to accept with respect to individual parties. If a bilateral netting arrangement leads traders to underestimate their true credit exposure, they might continue arranging deals even though they had exceeded their credit exposure limit.

Bilateral *netting by novation* is a way of reducing credit exposure. As in payments netting, two institutions engaged in netting by novation calculate their net obligations in each currency. Unlike payments netting, netting by novation legally discharges the gross obligations and replaces them with a new (novated)

⁴Floyds might have "rights of set-off" in this case that would, in effect, allow it to net its liabilities to a counterparty with its claims on that counterparty. The existence and scope of such rights vary among countries, however, and are not discussed in detail here. See "Report on Netting Schemes," pp. 13-14.

Absence of Legal Precedents Hampers Netting Arrangements

One impediment to establishing arrangements for netting by novation is their uncertain legality. Netting by novation replaces original gross obligations with new contracts requiring only the payment of net amounts.

No nation has any legal precedents upholding these contracts. The closest case we have is a 1975 British case involving not financial firms but two airlines: Air France and the now-defunct British Eagle. Both were part of a multilateral netting system operated by the International Air Transport Association. The Association acted as a clearinghouse, settling debts among individual airlines on a net basis. When British Eagle went under, its liquidator tried to recover the gross obligations owed to Eagle by Air France. Air France contended its obligation was limited to the net amount it owed to the clearinghouse. The court decided in favor of Air France and thus supported the legality of the netting contracts.

Of course, the details of the airline case differ from those in foreign exchange transactions, and the precedent applies only in one country, the United Kingdom. Courts around the world could rule differently on the enforceability of foreign exchange clearinghouse contracts. Should this happen, each financial firm involved in a bankruptcy situation would seek disposition of the case in the court most favorable to its interest. For instance, a British bank forced to liquidate could try to have its case against a French bank tried in France, where it might feel the netting contract has less chance of being enforced.

Netting systems are trying to overcome the uncertainties surrounding the legality of foreign exchange netting arrangements. One such system, FXNET, has developed agreement language it believes will stand in several legal jurisdictions, including the United States, Japan, and Switzerland. (For more information on these contracts, see *FXNET Legal Documentation*, Volumes 1 & 2, April 21, 1989.)

agreement for the net amount (see *Absence of Legal Precedents Hampers Netting Arrangements*). If an institution were to fail and, most importantly, the bankruptcy courts accepted the novated contracts as binding, the parties would be responsible for only the net amounts of the contracts, not the original gross obligations. Consequently, netting by novation effectively reduces each institution's credit exposure to the netted amounts. So in this case, Floyds' credit exposure, when expressed in dollars, really is reduced to \$35 million.

In sum, bilateral netting arrangements—payments netting and netting by novation—can substantially reduce the transaction costs and liquidity risk incurred by the netting parties. While all netting institutions will benefit, the degree of cost and liquidity-risk reduction depends directly on the number and magnitude of foreign exchange contracts maturing on a particular day. While bilateral payments netting has the potential to reduce credit exposure, netting by novation will undoubtedly reduce this risk.

MULTILATERAL NETTING

Another form of netting—*multilateral netting*—can further cut the transaction costs of foreign exchange trading, as well as potentially reduce liquidity and credit risk. Multilateral netting involves some agreement that directs how individual parties will net as a group and share the risk of default of any participant. The presence of this agreement provides multilateral netting with the additional feature of potentially reducing *systemic risk*—the risk that a default at one institution could trip otherwise solvent institutions into default.

Several multilateral netting proposals suggest the use of an institution that stands between individual banks. In these cases, multilateral foreign exchange netting is a system in which financial institutions engaged in foreign exchange transactions net their gross obligations with a central counterparty. This facility

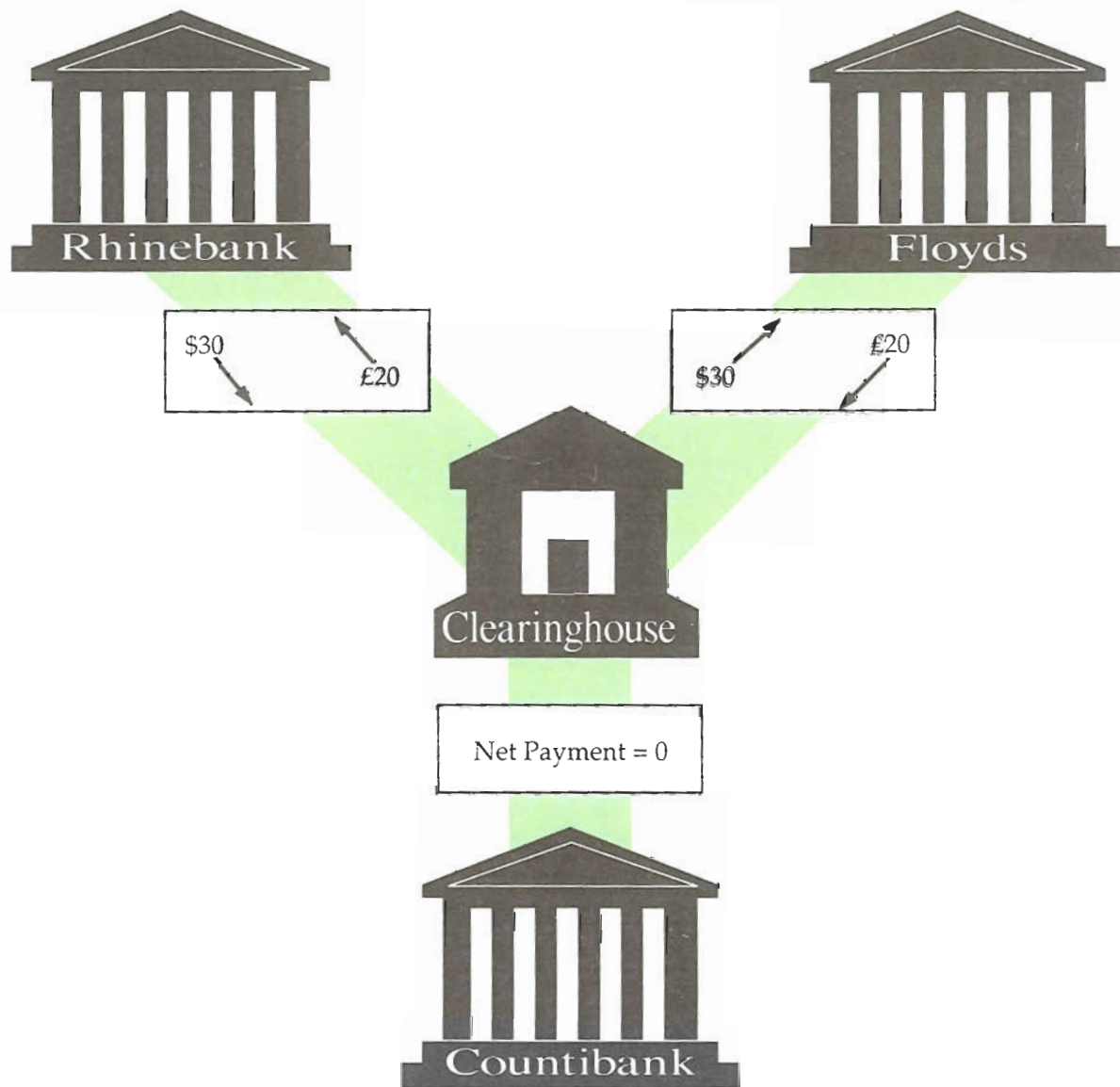
functions as the clearinghouse for the inter-bank transactions. This central counterparty would also function as the settlement agent for the system, initiating the final settlement for the participating institutions. It can be organized under various structures, including a partnership of members who clear or an independent agency that agrees to act in this capacity. The netting strategy works the same as in bilateral netting, except that the institutions make or receive only one payment in each currency to or from this third party.

With multilateral netting, once two institutions arrange a foreign exchange contract, they notify the central counterparty of their deal. Once the central authority verifies the contract, the original gross obligations between the institutions are replaced by agreements between the individual banks and the central authority. As subsequent transactions are recorded, each bank accumulates a net position with the central authority. At the end of trading, no matter how many institutions it deals with each day, a bank makes or receives only one net payment in each currency to or from the clearinghouse.

Multilateral netting reduces transaction costs and liquidity risk... Figure 3 presents the payments flows resulting from the multilateral netting of payments between the three banks and the central counterparty in our example. Based on the set of underlying obligations, Countibank will process no payments or receipts in any currency, since on net it is square with the central authority. Multilateral netting also reduces liquidity risk. On net, Rhinebank is owed only £20 million, and Floyds only US\$30 million, from the central counterparty.

...But Credit Risk May Not Be Reduced. The ability of a multilateral netting arrangement to reduce credit risk depends on the structure of the agreement. *Multilateral payments* netting takes essentially the same form as its bilateral cousin. While the individual banks accumulate net balances against the central counterparty, the original gross obligations

FIGURE 3
Payments and Receipts Under Multilateral Netting



TOTAL TRANSACTIONS = 4

Credit Exposure: Multifateral Netting

	Total Expected Receipts			Converted to Dollars (DM2 = US\$1, US\$1.5 = £1)
	US\$	DM	£	
Rhinebank	0	0	20	30
Floyds	30	0	0	30
Countibank	0	0	0	0
Clearinghouse	30	0	20	60

remain in effect until final net payments are received. If one institution were to default, this netting system would require all transactions involving the defaulting institution to be removed from the clearinghouse's books. Once the obligations with the defaulting institution are "unwound" into their original bilateral obligations, new net positions would be calculated between the solvent institutions and the clearinghouse.⁵ Any transaction with the defaulting institution must then be settled on a bilateral basis between that institution and the particular trading partner.

There Is a Way to Reduce Credit Risk... In contrast to payments netting, *multilateral netting by novation and substitution* reduces credit risk. Under this system, once the institutions notify the central authority of their foreign exchange contract, new agreements between each of the individual banks and the central counterparty are substituted for that original obligation between the two banks. These new (novated) agreements legally take the place of the original contract. If one of the institutions were to default, the netted obligations of the other institutions with respect to the central authority would remain in effect. Those arising from trades with the defaulting bank would not be unwound.

⁵The New York Clearing House for Interbank Payments System (CHIPS) currently would "unwind" obligations should any institution default. On June 4, 1986, the New York Fed conducted a survey of the transactions passing through CHIPS on a "typical" day. The survey found that foreign exchange transactions accounted for 72.6 percent of the system's 28 billion transactions. CHIPS is developing a new payment finality program that would eliminate the risk of transactions being unwound should an institution fail to meet its obligations. The program calls for the 140 U.S. and foreign banks in CHIPS to pledge about \$4 billion in U.S. government securities as collateral that would be sold to cover the transactions of an institution that could not settle by the normal close of business. See "Large-Dollar Payment Flows From New York," Federal Reserve Bank of New York *Quarterly Review* (Winter 1987-88) and "Members of Chips Agree to Share Payment Risks," *American Banker*, March 19, 1990.

If Rhinebank were to default, Countibank would not have to make or receive any payments with respect to either the clearinghouse or Rhinebank because its net position was zero. Likewise, Floyds' obligation to the central authority would also be unchanged. It would receive US\$30 million and owe the central counterparty £20 million. Thus, this form of netting reduces each bank's credit exposure from the amount of the gross liabilities to the net position against the clearinghouse. In other words, the central counterparty bears the credit exposure in this system; that is, it would still be obligated to pay Rhinebank £20 million, even if Rhinebank were to default on its payment.

...and Systemic Risk May Be Reduced. Prior to the default of Rhinebank, Countibank had no obligation with respect to the clearinghouse since its net position was zero. If multilateral payments netting were in effect, then after the default and unwinding of Rhinebank's transactions, Countibank would not only have to make payments directly to Rhinebank—its original gross obligations—but it would also have liabilities to the clearinghouse. If Countibank could not meet these obligations, it too would have to default. Multilateral payments netting provides no mechanism to prevent the failure of one institution from infecting other institutions in the payments system. Thus, multilateral payments netting would not help reduce systemic risk. Multilateral netting by novation and substitution, however, can reduce systemic risk. Since the system does not unwind transactions if a party fails, the clearinghouse essentially shields the other institutions from the failed party and absorbs the systemic risk. In terms of our previous example, the clearinghouse would still pay Floyds US\$30 million, even though it had received no funds from the bankrupt Rhinebank.

The risk shield of multilateral netting by novation and substitution, however, is only as strong as the capital position of the central counterparty. That is, the degree of reduction

in systemic risk depends entirely on the central agent's ability to fulfill its payment obligations even if one or more of its debtors default. If the clearinghouse could not sustain the loss, the netted amounts could possibly be unwound into the gross obligations. Without sufficient capital, then, multilateral netting by novation and substitution provides no advantage over multilateral payments netting.

Say the central agent is organized and capitalized by a consortium of financial institutions. These institutions would reduce systemic risk by pooling the risk and sharing it among themselves. They would bear the cost of supplying the needed funds to pay off the clearinghouse's debts should a member institution fail. If an independent institution serves as the central counterparty, it must have either sufficient funds or lines of credit on which it can draw should one of its debtors fail.

Securing the necessary financial capital is crucial to the success of any multilateral netting arrangement, and it can be costly. But it is just one of the many costs of establishing and maintaining such a system. There are financial, legal, and computer costs as well. In fact, many of these costs are incurred even in bilateral netting arrangements. Ultimately, the desirability of any netting system hinges on its risk-reduction benefits outweighing all these costs.

CURRENT EFFORTS TO DESIGN NETTING ARRANGEMENTS

Facing tremendously expanded activity in the foreign exchange market, financial institutions are finding the use of netting schemes increasingly desirable to control transaction costs and reduce risk. As a result, a number of competing bilateral and multilateral foreign exchange netting systems are being developed. Some are already in operation; others are on the drawing board.⁶

⁶Summaries of some of these projects are presented in "Banking and Payment Services: Official Papers of an Inter-

The FXNET netting system—a London-based limited partnership—currently provides a bilateral netting by novation system in London and New York for participating institutions. FXNET has designed the computer facilities and supporting legal documents used by individual institutions that arrange bilateral netting agreements on these markets.

International Clearing Systems, INC. (ICSI), a wholly owned subsidiary of the Options Clearing Corporation, is developing a multilateral netting by novation and substitution arrangement.⁷ This plan envisions foreign exchange clearinghouses as self-regulating organizations, with rules and bylaws written and administered by their participants and owners. These financial institutions would be responsible for funding the clearinghouse.

The Euronetting project, currently being developed under the direction of the Banca Commerciale Italiana, would also provide netting by novation and substitution.⁸ Its central clearinghouse is envisioned as a legal corporation capitalized by a top tier of paying agents or banks. The handful of top-tier banks

national Symposium Sponsored by the Board of Governors of the Federal Reserve System," *Payment Systems Worldwide* 1 (Spring 1990).

⁷See ICSI, "Netting of Foreign Exchange Trades and Other Obligations: An Illustration of the Use of On-line, Real Time Clearance and Settlement Systems for the Quantification and Control of Risk in Financial Markets," a submission to the Office of Technology Assessment, United States Congress, for its study *Clearing and Settlement of Financial Instruments Worldwide* (February 1989). The Options Clearing Corporation (OCC) currently operates such a clearinghouse for options, including foreign exchange options, traded on U.S. securities exchanges. The OCC is owned by the Chicago Board Options Exchange, the American Stock Exchange, the Philadelphia Stock Exchange, the Pacific Stock Exchange, and the Mid-West Stock Exchange.

⁸See Renato Polo, "A Perspective on the Euronetting Project," *Payment Systems Worldwide* 1 (Spring 1990) pp. 46-47.

would be responsible for maintaining the clearinghouse accounts, transferring funds among correspondent banks, and supplying needed capital if a member institution fails.

The Society for Worldwide Interbank Financial Telecommunication (SWIFT), the world standard for interbank financial communications, is developing a new service called ACCORD. This service will match (unofficially net) foreign exchange transactions between institutions and advise institutions of opportunities to net their foreign exchange payments. As such, ACCORD would operate as an information service and would not be legally responsible for arranging netting agreements between institutions. Introduction of this service is planned for 1990.

Central banks have been studying private financial institutions' efforts to develop foreign exchange netting arrangements.⁹ Their interests include establishing safe systems, limiting their risk exposure, and ensuring proper regulation. As with any financial market inno-

vation, netting arrangements might raise new supervisory and regulatory issues. For instance, central bankers are aware that there is a natural tendency for markets to move from a more to a less strictly regulated environment.¹⁰ The regulation of payments systems in major financial centers, such as those in the United States or Europe, could drive systems to less regulated or completely unregulated centers, such as those in the Caribbean.

CONCLUSION

The use and continued development of foreign exchange netting arrangements offer the potential to improve the efficiency and reduce the costs of dealing in the rapidly expanding foreign exchange market. While these systems will undoubtedly reduce transaction costs, their ability to reduce the various risks—liquidity, credit, and systemic—depends on the legal structure of the system. The work of central banks and private institutions on these netting schemes should help ensure a more efficient and less risky foreign exchange market.

⁹For more information, see *Payment Systems in Eleven Developed Countries*, prepared under the aegis of the Bank for International Settlements by the Central Banks of the Group of Ten Countries and Switzerland (May 1989); and Federal Reserve Governor Wayne Angell, "Cooperative Approaches to Reducing Risks in Global Financial Markets: Issues and Policies," May 14, 1990. The views of the Group of Experts on Payments Systems from the G-10 central banks concerning netting arrangements are expressed in "Report on Netting Schemes," Group of Experts on Payments Systems of the Central Banks of the Group of Ten Countries, Bank for International Settlements (February 1989).

¹⁰Speaking before an international symposium, Tommaso Padoa-Schioppa, Deputy Director General of the Banca d'Italia, stated, "For instance, the recent initiatives to reduce systemic risk on Fedwire and CHIPS could be undermined by the shift of some of the dollar payments to 'offshore' clearing systems" (from "Payment Systems: A New Ground for Central-Bank Cooperation," speech before the International Symposium on Banking and Payment Service, sponsored by the Board of Governors of the Federal Reserve System, June 9, 1989, p. 16).