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McNamara's: Finance Committee - January 1980 to February 1980

Vol 2

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Finance Committee Files - Finance Committee 02

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OFFICE MEMORANDUM

TO: Members of the Finance Committee  
FROM: Paul V. Applegarth, Chief, Financial Analysis, PAB  
SUBJECT: Meeting of the Finance Committee

DATE: January 28, 1980

The attached paper on the Currency Pooling system prepared by the Controller's Department will be discussed at the next regularly scheduled meeting of the Finance Committee, Tuesday, February 12th, in Mr. McNamara's office. The meeting will start at 3:00 p.m. rather than the usual 2:00 p.m. A full agenda for this meeting will be distributed shortly.

Attachment

PVApplegarth:sl

*And there are questions  
about the  
departmental decision 2/82  
11:57 AM 1/28/80*

*Review*

MEMORANDUM TO THE EXECUTIVE DIRECTORS

SUBJECT: CURRENCY POOLING SYSTEM

*refer to budget  
trans 1/28/80?*

Introduction

At their meeting on February 6, 1979, the Executive Directors of the Bank endorsed the recommendations included in the memorandum from the President dated November 30, 1978 (R78-259) entitled "Distribution of Exchange Rate Risks Among Borrowers" that work be initiated to permit the introduction of currency pooling as early as possible, and in any event, no later than July 1, 1980. This paper provides an outline of the conceptual design and operation of the proposed Currency Pooling System. Section I summarizes the present system of loan disbursements and recalls; Section II describes the concept in broad outline of the Currency Pooling System; Section III sets forth the basic elements of the loan agreements under the Currency Pooling System; Section IV outlines the operation of the Currency Pooling System; and Section V concludes with an assessment of the Currency Pooling System in comparison with the current system. A glossary of terms used in this paper and a technical illustration of the operation of the Currency Pooling System are attached as annexes.

I. The Present System of Loan Disbursements and Recalls

1. At present, when a loan agreement is signed the amount of the loan, which is expressed in U.S. dollars, is credited to a Loan Account, from which the borrower has the right to withdraw various currencies to meet expenditures for the project. The Bank has full discretion in the selection of the currency it disburses to furnish the borrower, ~~with the currency withdrawn, either by paying it out of its own holdings of that currency, or by paying it after first purchasing it with another currency held by it.~~ The principal of the loan is repayable in the currencies that the Bank actually used for the disbursement.

The selection of the currencies to be recalled for each instalment of principal repayment is determined by the Bank from among the currencies outstanding on the loan. Interest is payable in the various currencies outstanding on the principal amount of the loan.

2. The Bank's discretion in the selection of the currencies it disburses, and in the selection of currencies it recalls in repayment, ensures the required flexibility in the Bank's currency management. It permits the building up of cash holdings in the currencies required to meet debt service on Bank borrowings, the accommodation of the lending member's expectations regarding the drawing down of the proceeds of Bank borrowings, and the structuring of the currency composition of the Bank's liquid assets to maximize ~~investment~~ income.

3. On the other hand, the different timing of disbursements and recalls, the availability of currencies for disbursements, and the debt service requirements on Bank borrowings, result in variation in the currency composition of individual disbursements and recalls, and consequently a varied currency composition of the principal outstanding as between different loans, exposing the borrowers to different risks pertaining to exchange rate fluctuations. Currency pooling is being adopted as a solution to this problem.

## II. Currency Pooling

4. The Concept. The objective of currency pooling is the equalization of the risks pertaining to exchange rate fluctuations among all loans included in the scheme, while reserving to the Bank full discretion in the selection of the currencies it disburses on the loans and recalls for principal repayment.

Equalization of the risks pertaining to exchange rate fluctuations implies, at least conceptually, the alignment of the currency composition of each loan to the currency composition of the total population of loans (the Pool).

5. Aggregation of Currencies: Translation into the Numeraire. Every disbursement and recall will change the currency composition of the Pool, inducing similar changes in the currency composition of the individual loans. In order to aggregate the various currencies in the Pool, all currency values will be translated into a "numeraire," the U.S. dollar, the currency by reference to which the amount of the loan is denominated in the individual loan agreements. The rate at which each individual currency will be translated into its U.S. dollar equivalent is defined as the "Applicable Exchange Rate," which will be determined each day and applied to the valuation of all balances and transactions of that day.

6. Time Unit for Consolidation of Individual Transactions. As stated above the currency composition of the Pool will change with every disbursement and recall. However, it will not be necessary to align the currency composition of individual loans to that of the Pool after each disbursement and recall, as long as the rates at which the currencies are translated remain unchanged. Since the Applicable Exchange Rates are determined every day and remain unchanged during that particular day, the currency composition of the Pool and of the individual loans will be established on the basis of the closing balances of each day after the day's transactions have been added to the opening balances

of the day. The day on which transactions will be accounted for is the "value date," which (1) for disbursements will be the date on which the Bank's depository charges the Bank's account or the date on which the Bank issues a check in execution of the disbursement, (2) for recalls, the due date of a principal repayment (the scheduled date for repayment of a principal repayment or the agreed date on which a prepayment of principal will become effective), and (3) for sales, the agreed date on which the sale of the loan (or part of the loan) to a third party will become effective.

7. Equalization of the Exchange Risks of Individual Loans. At the close of business each day, after all the day's transactions have been added to the opening balances of the Pool and the individual loans, the closing balances of the currencies in the Pool will be established, and the individual loans' shares in those currencies will be determined on the basis of the loans' closing balances in terms of the numeraire. Thus each individual loan will have the same currency composition as the Pool and consequently the same risks pertaining to exchange rate fluctuations.

8. Accounting. Since the currency composition of the individual loan will change every day in line with the currency composition of the Pool, the rate of appreciation or depreciation of the dollar value of the loan resulting from exchange rate changes will be identical to that for the Pool. Therefore, the accounting in currencies will be kept only for the Pool as a whole, while the accounting for the individual loans will be kept only in terms of the numeraire,

the U.S. dollar, revalued every day by the same rate of appreciation or depreciation for the Pool. The dollar balance of the individual loan will accurately reflect the dollar value of its share of the various currencies in the Pool.

III. Basic Elements of the Loan Agreements under the Currency Pooling System

9. In line with the above, the basic elements of the loan agreements under the Currency Pooling System will be determined as follows:

- (a) As at present, the loan agreement will stipulate that the amount of the loan, expressed in U.S. dollars, will be credited to a Loan Account, from which the borrower will have the right to withdraw from time to time various currencies up to the loan amount.
- (b) The withdrawal of a currency will be charged to the Loan Account at its U.S. dollar equivalent if it is paid out of the Bank's holdings of that currency, and if it has been purchased by the Bank for the purpose of the withdrawal with another currency held by the Bank, at the U.S. dollar equivalent of the currency used for the purchase in the amount paid by the Bank on such purchase.
- (c) The principal amount of the loan disbursed and outstanding will be the loan's share of the various currencies disbursed and outstanding on all loans included in the Currency Pooling System.

*By ds  
2/2/54*



- (d) The borrower's repayment obligation with respect to the amortization of the principal will be the value in terms of the numeraire, the U.S. dollar, of the maturity multiplied by the ratio of the loan's share of the various currencies disbursed and outstanding on all loans included in the System as of the commencement of business on the due date, to the total amount of "withdrawals outstanding" (the amount of disbursements outstanding at the exchange rates when disbursed). This ratio will be called the "Amortization Adjustment Factor". The repayment obligation will be payable in the currency designated by the Bank.
- (e) Interest will accrue on the daily balance of the loan's share of currencies, and the interest payment obligation will be the value in terms of the numeraire of interest accrued in the currencies as of the due date. The interest payment obligation will be payable in the currency designated by the Bank.
- (f) Commitment charges on undisbursed loan amounts and special commitment charges on Bank agreements to reimburse commercial banks for negotiation of bills under letters of credit will accrue on the undisbursed balances in the Loan Account and the undisbursed amounts of the agreements to reimburse respectively, both of which are expressed in U.S. dollars. They are payable in the currency designated by the Bank.

- (g) The translation of a currency into its equivalent in the numeraire, the U.S. dollar, will be effected at the exchange rate of the value date used by the Bank in its accounting (the Applicable Exchange Rate).
- (h) All funds received by the Bank from a borrower in payment of principal or loan charges will be applied in settlement of the borrower's payment obligation on the due date. If the funds received by the Bank on or prior to the due date are insufficient to meet the values due, they will be applied to principal, if any, commitment charges and interest in that order. Any part of the borrower's obligation not settled on the due date will become a late payment obligation in the currency previously designated by the Bank for payment. Funds received by the Bank after the due date will be applied to commitment charges, interest and principal, if any, in that order.
- (i) The Bank will offer, as at present, its services to purchase the designated currency for the account of the borrower.

#### IV. Operation of the Currency Pooling System

10. The Loan Account. As at present, the amount of the loan expressed in terms of the U.S. dollar, will be credited to the Loan Account, and withdrawals by the borrower (disbursements by the Bank) will be debited to it in the U.S. dollar equivalent of currencies disbursed at the exchange rate of the day of disbursement. The amount of withdrawals plus the undisbursed amount remaining

in the Loan Account at any time will be equal to the loan amount. Since the value of a withdrawal is identical to the value of the disbursement in terms of the numeraire, the U.S. dollar, the value of total withdrawals outstanding (total withdrawals net of repayments) is the value of the principal amount outstanding on the loan at the exchange rates when the disbursements were originally made.

11. Central Disbursement Account. In order to facilitate the valuation of currencies and the determination of the individual loans' shares, a Central Disbursement Account will be created to record all transactions in the loans included in the Currency Pooling System (Pooled Loans) in currency and in U.S. dollar equivalent. The Central Disbursement Account will represent a consolidation of all individual Borrowers' Indebtedness Sub-Accounts, which record the balances and transactions of the principal amount outstanding on individual loans. The Borrower's Indebtedness Sub-Account will be kept in U.S. dollar equivalents only, revalued for exchange rate changes, so that the outstanding balances will express the U.S. dollar value of the loan's share of currencies in the Pool.

12. Disbursements. On the first operational day of the Currency Pooling System, that is, when a disbursement takes place for the first time on a loan included in the Currency Pooling System, the following procedures will be executed:

- (a) The Loan Account will be charged with the U.S. dollar equivalent of the currency of withdrawal.
- (b) The Borrower's Indebtedness Sub-Account will be debited with the U.S. dollar equivalent of the currency of disbursement (the currency of withdrawal, unless it is pur-

chased by the Bank with another currency, in which case, the other currency used for the purchase), which is identical to the amount charged to the Loan Account.

- (c) The Central Disbursement Account will be debited with the currency of disbursement and its U.S. dollar equivalent to reflect the transactions on the individual loans.
- (d) After all disbursements of the day have been entered, the closing balances of the Central Disbursement Account will be established in currencies as well as in U.S. dollar equivalents, while the closing balances of the individual Borrowers' Indebtedness Sub-Accounts will be established in U.S. dollar equivalents alone. The closing balances in currencies of the Central Disbursement Account will be the total amounts outstanding in various currencies on the entire population of Pooled Loans and the closing balance in U.S. dollar equivalent of the Central Disbursement Account will be the total U.S. dollar equivalent of the various currencies outstanding, corresponding to the total of the closing balances of individual Borrowers' Indebtedness Sub-Accounts. Since all transactions in each currency have been translated into U.S. dollar equivalents at a single exchange rate, the closing balance of a Borrower's Indebtedness Sub-Account will represent the total U.S. dollar value of its share of currencies in the Pool.

13. Revaluations. The closing balances in currencies in the Central Disbursement Account on each day will be carried forward. As soon as the Applicable Exchange Rates of the following day are determined, the balances brought forward will be revalued at those rates. The ratio of the revalued dollar equivalent opening balance to the previous day's closing balance will be defined as the "Revaluation Factor" of the day. The closing balances in the Borrowers' Indebtedness Sub-Accounts of the previous day will be carried forward and revalued by the Revaluation Factor to constitute the revalued opening balances of the day. Since the currency composition of the individual loans is identical to that of the Central Disbursement Account, the revalued opening balance in the individual Borrower's Indebtedness Sub-Account will correctly reflect the total of the revalued U.S. dollar equivalents of the loan's share of currencies in the Pool. As mentioned in 9(d) above, the ratio of the revalued opening balance of the Borrower's Indebtedness Sub-Account to the "withdrawals outstanding" (the total amount of withdrawals net of amortizations) is defined as the "Amortization Adjustment Factor" of the day and is used to translate the amount of principal outstanding at the exchange rates when the disbursements were made into the current value of the borrower's principal obligation, or, in other words, to reconcile the Borrower's Indebtedness Sub-Account with the activities in the Loan Account.

14. Recalls for Principal Repayment. On the due date of a principal repayment the following procedure will be followed:

- (a) The amount of withdrawals outstanding will be reduced by the amount of the maturity in the Amortization Schedule.

- (b) The dollar value of the repayment obligation will be established by applying the Amortization Adjustment Factor for the day to the amount of the maturity in the Amortization Schedule.
- (c) The U.S. dollar value of the repayment obligation will be credited to the Borrower's Indebtedness Sub-Account.
- (d) The currency which the Bank has designated in advance for recall, in an amount equivalent to the U.S. dollar value of the repayment obligation and its U.S. dollar equivalent will be credited to the Central Disbursement Account and transferred to the debit of a Loans Due Account.
- (e) Funds received from the borrower for loan service will be credited to the Loans Due Account in settlement.

15. In summary, therefore, at the close of business each day the closing balance of each Borrower's Indebtedness Sub-Account is arrived at as follows:

- (a) Balance outstanding at the close of business on the previous day revalued by the day's Revaluation Factor;  
minus
- (b) any repayment obligation due that day;  
plus
- (c) the U.S. dollar equivalents of any disbursements of the day.

16. Loan Charges. Interest will be calculated by adding the loan's daily share of each currency for the period and applying the daily interest rate (the

contractual interest rate of the loan agreement divided by 365 or 366 as required) to the totals for each currency. The value of interest due in terms of the numeraire will be established at the Applicable Exchange Rates for the due date.

17. Commitment charges and special commitment charges are calculated by adding the daily undisbursed balances in the Loan Account and the daily undisbursed balances of the agreements to reimburse for the period and applying the respective daily charge rate to the totals.

18. Provisional Payment and Settlement. Since the value of the principal repayment obligation and the value of loan charges due cannot be determined in advance of the due date, loan service payments by the borrower will be provisional, subject to adjustment after final values have been established on the due date.

19. If the funds received in loan service from the borrower exceed the value of the principal repayment obligation and the value of loan charges due, the excess will be returned to the borrower unless the amount is not significant, in which case it will be carried forward to the next loan service due date. If the funds received are insufficient to meet the values due, the amount of any shortfall will be established in the currency previously designated for payment which the borrower should settle within a reasonable time. If the shortfall relates to loan charges and the amount is not significant, it will be settled on the next loan service due date.

#### V. Conclusion

20. The implementation of the Currency Pooling System as described above should bring a number of benefits to both the Bank and its borrowers.

21. First, the Currency Pooling System will ~~accurately~~ equalize the risks pertaining to exchange rate fluctuations among all borrowers, which is impossible under the present system.

22. Second, it will benefit the borrowers inasmuch as the repayment burden for any particular maturity will no longer vary depending on the selection of the currency the Bank recalls for repayment. Under the present system, the amount in the currency the Bank recalls for a maturity is determined by converting the U.S. dollar amount of the maturity into the recalled currency by the application of the weighted average of the exchange rates at the time the disbursements in that currency were made. Thus the current value in terms of U.S. dollars of the actual repayment of a maturity will vary according to the currency the Bank decides to recall. Under the Currency Pooling System, the current value in terms of the U.S. dollar of a maturity will be the same irrespective of the currency the Bank decides to recall.

23. Third, the Currency Pooling System should also reduce the accounting work for the borrower. At present, the principal outstanding on a loan is in the various currencies disbursed and outstanding on that loan. Most loans have an average of ten currencies outstanding and several have as many as twenty-six, involving accounting in each of those currencies. Under the Currency Pooling System borrowers will have to keep only a loan ledger which will be the counterpart of the Bank's Loan Account, and a principal outstanding ledger, the counterpart of the Bank's Borrower's Indebtedness Sub-Account, both to be kept in U.S. dollar terms. The amount of each disbursement in the two ledgers will be identical, and the balances in the two ledgers will be reconcilable by the appli-



cation of the Amortization Adjustment Factor for the day. In this connection it is planned to send to the borrower statements on the loan on a semi-monthly basis rather than on a semi-annual basis as at present, together with the daily Revaluation Factors and the Amortization Adjustment Factors, to permit the borrower to update his records in a timely manner. Semi-monthly statements on the Pool will be prepared for distribution on request.

24. Finally, the borrower will be relieved of the administrative burden of acquiring for debt service payments every six months, several currencies some of which may not be easily obtainable. At present, principal and interest are payable in the several currencies outstanding on the loan, while commitment charges are payable in U.S. dollars. Under the Currency Pooling System, loan service due for a loan on a given due date, will be payable in a single currency designated by the Bank, as required for debt service on its borrowings or for investment purposes. Currencies not required for the Bank's debt service, and currencies with no or limited investment profitability will not be designated for loan service payment, but will be left indefinitely on loan. In particular, of the currencies deriving from the 9% portion of the capital subscriptions released for lending (amounting to \$2.3 billion as of the end of FY 1979), those which cannot be invested may be left indefinitely in the Pool after being disbursed on a pooled loan, providing some element of stability in the currency composition of the Pool.

25. In summary, the Currency Pooling System as designed above should achieve its principal objective of equalizing among all borrowers under the Currency

Pooling System the risks pertaining to exchange fluctuations, while simplifying currency management, loan accounting and administration for both the borrower and the Bank.

?  
incremental  
cost for RR

Glossary of Terms Used in this Paper

Amortization Adjustment Factor: The ratio of the current value in terms of the U.S. dollar of the principal outstanding of a loan at the commencement of business of a day to the corresponding total of withdrawals from the Loan Account net of recalls for amortization (withdrawals outstanding). Its function is to translate the value of disbursements net of recalls at the exchange rates at the time the disbursements took place, into the current value of the loan's principal outstanding. Its principal use is in translating a maturity in the Amortization Schedule of a loan agreement into its current value to be recalled.

Amortization Schedule: The schedule in the loan agreement fixing the due dates and the amounts of instalments (maturities) in which the principal of the loan is to be repaid (amortized). The amounts of the instalments are expressed in U.S. dollars, and the total of the instalments equals the loan amount.

Applicable Exchange Rate: An exchange rate established by the Bank for a currency for a date for use in the accounting systems.

Borrower's Indebtedness Sub-Account: This is a sub-account of the Central Disbursement Account and records in dollar terms the current value of principal amount disbursed and outstanding on each loan.

Central Disbursement Account: An account in which are recorded all transactions for the pooled loans in the Currency Pooling System by currency and US dollar equivalent. The account is a consolidation of all individual borrowers' indebtedness sub-accounts.

Currency of Withdrawal: The currency withdrawn by the borrower from the Loan Account. Except as the borrower and the Bank shall otherwise agree, the currency of withdrawal shall be the currency of expenditure; provided, however, that when the currency of expenditure is the currency of the member borrower or member guarantor, the currency of withdrawal will be such other currency as the Bank shall from time to time reasonably select.

Designated Currency: The currency which is designated by the Bank to be credited to the Central Disbursement Account when an amount is to be removed from the Pool on repayment of an amount of principal outstanding on a loan or when interest and commitment charges are to be paid by a borrower. The currency will be designated at the time the statement of account is sent to the borrower about six weeks prior to the due date.

Disbursement: The use of a currency held by the Bank to furnish the borrower with the currency he withdraws from the Loan Account. The Bank may furnish the currency withdrawn by disbursing it out of its holdings of that currency. Alternatively the Bank may disburse a currency it holds to purchase the currency withdrawn and then furnish it to the borrower.

Due Dates: The two semi-annual payment dates agreed upon for every loan. They fall on the first or fifteenth day of a month.

Loan Account: The term Loan Account means the account opened by the Bank on its books in the name of the borrower to which the amount of the loan is credited. The borrower has the right to withdraw from the Loan Account various currencies up to the amount of the Loan. It appears as a liability in the Bank's financial statements entitled "Undisbursed Balance of Effective Loans."

Loan's Share: The share of each loan in each currency disbursed and outstanding in the Central Disbursement Account.

Revaluation Factor: A ratio establishing the appreciation or depreciation due to exchange rate changes in the U.S. dollar value of currencies in the Pool from one date to another. It is calculated by dividing as of any day the total dollar value at the exchange rates of that day of the balances of currencies in the Pool brought forward from the previous day, by their total dollar value at the exchange rates of the previous day.

Value Date: The calendar date on which a transaction takes place.

Withdrawals: A withdrawal of currencies from the Loan Account by a borrower.

Technical Illustration

Introduction

1. In this Annex, the operations of the Currency Pooling System are explained using a four-currency, four-loan model covering disbursements and repayments over seven transaction days. The data are presented in the form of three tables attached to this Annex. Table 1 illustrates the operation of the Central Disbursement Account. Table 2 shows the corresponding accounting in the Loan Account and the Borrowers' Indebtedness Sub-Accounts. Table 3 illustrates the relationship between the Revaluation Factor and the Amortization Adjustment Factor.

Central Disbursement Account - Table 1

2. In the Central Disbursement Account, the currency amounts of principal transactions and their U.S. dollar equivalents calculated at the respective Applicable Exchange Rates (AERs) are recorded for each day. Balances are established in currencies and in U.S. dollar equivalents for the close of each day. The currency balances are then carried forward to become the opening balances of the following day. They are revalued at the AERs of the following business day to form the revalued opening balances in dollar equivalents of that day. The Revaluation Factor for the Pool is computed each day as a ratio of that day's total dollar value of the opening currency balances to the previous day's closing total dollar value of those (same) currency balances.

Loan Accounts, Withdrawals Outstanding and  
Borrower's Indebtedness Sub-Accounts - Table 2

3. The Loan Account and the Borrower's Indebtedness Sub-Account for each loan are maintained in U.S. dollar equivalents only.

4. The Loan Account is credited with the amount of the loan, which is expressed in U.S. dollars. The borrower has the right to withdraw currencies from the Loan Account. These withdrawals are charged to the Loan Account at the dollar equivalent of the currency the Bank disbursed to furnish the borrower with the currency withdrawn. The balance in the Loan Account is the undisbursed amount of the loan, and total withdrawals plus the Loan Account balance equals at all times the loan amount.

5. The Borrower's Indebtedness Sub-Account reflects the daily value in dollar terms of the loan's principal outstanding, or the loan's share of the currencies in the Central Disbursement Account (the Pool). In Table 2 the activities of the Borrower's Indebtedness Sub-Account are shown under the heading "Principal Outstanding".

6. Additionally, the value of the borrower's obligation in withdrawal terms is shown under the heading "Withdrawals Outstanding". Withdrawals outstanding represent the principal outstanding at the value of the disbursements outstanding at the exchange rates when the individual disbursements were originally made.

7. Individual transactions are recorded at their U.S. dollar equivalent at the AER of the day in the Borrower's Indebtedness Sub-Account, their value in withdrawal terms being entered under "Withdrawals Outstanding." For disbursements, the Loan Account (undisbursed balance) will also be reduced by the amount of the withdrawal.

8. Balances are established for the close of each day in the Loan Accounts and in the Borrowers' Indebtedness Sub-Accounts. The sum of the closing balances of the individual Borrowers' Indebtedness Sub-Accounts will be equal to

the dollar value of the closing balance of currencies in the Central Disbursement Account (see Table 1).

9. Loan Share ratios, representing the share of each loan in the currencies disbursed and outstanding in the Central Disbursement Account, are calculated for each day as a ratio of the dollar value of the closing balance of the Borrower's Indebtedness Sub-Account for a loan to the dollar value of the closing balance of currencies in the Central Disbursement Account.

10. The balances in the Borrowers' Indebtedness Sub-Accounts at the close of each day are revalued on the following business day by the application of the Pool Revaluation Factor to form the opening balances for the new day.

11. Table 2 also displays the daily Amortization Adjustment Factor for each loan. This ratio expresses the relationship between the opening balance of the Borrower's Indebtedness Sub-Account and the "Withdrawals Outstanding". It is used to translate principal amounts from their current dollar values to their respective values in withdrawal terms, or vice versa. The relationship between the Amortization Adjustment Factor and the Pool Revaluation Factor is explained in paragraphs 26 through 30 below.

Pool and Loan Activities

12. The model used to illustrate the currency pooling methodology consists of four loans as follows:

	<u>Loan 3001</u>	<u>Loan 3002</u>	<u>Loan 3003</u>	<u>Loan 3004</u>
Loan amount (U.S. dollars)	2,000,000.00	3,000,000.00	4,000,000.00	5,000,000.00

13. Disbursement and repayment transactions under this pooling system are assumed to occur on six transaction days in four currencies: currency A,



currency B, currency C and the U.S. dollar. These transactions are summarized in the table below.

	<u>Loan 3001</u>	<u>Loan 3002</u>	<u>Loan 3003</u>	<u>Loan 3004</u>
Day 1 Disbursements		A 400,000.00 B 300,000.00	C 400,000.00	\$100,000.00
Day 2 Disbursements	B 298,000.00	C 402,000.00		
Day 3 Disbursements		A 204,000.00	B 296,000.00	
Day 4 Disbursement Repayment		(Maturity of \$100,000.00) -A 204,771.69	B 294,000.00	
Day 5 Disbursements		B 292,000.00	B 292,000.00	
Day 6 Disbursements Repayment	A 420,000.00	C 410,000.00	(Maturity of \$100,000.00) -B 289,639.15	

14. The following Applicable Exchange Rates (AERs) have been assumed for the three non-dollar currencies over the pool period:

	<u>Currency A</u>	<u>Currency B</u>	<u>Currency C</u>
Day 1	2.00	3.00	4.00
Day 2	2.02	2.98	4.02
Day 3	2.04	2.96	4.04
Day 4	2.06	2.94	4.06
Day 5	2.08	2.92	4.08
Day 6	2.10	2.90	4.10
Day 7	2.12	2.88	4.12

15. On Day 1, the respective Loan Accounts are charged with the U.S. dollar equivalents at the day's AERs of the currencies of withdrawal, which are the same as the currencies of disbursement. Accordingly, Loan Account 3002 is charged with \$300,000.00 equivalent (A 400,000.00 at AER 2.00, plus B 300,000.00 at AER 3.00); Loan Account 3003 is charged with \$100,000.00 equivalent (C 400,000.00 at AER 4.00); and Loan Account 3004 is charged with \$100,000.00.

16. The respective Borrowers' Indebtedness Sub-Accounts are debited on Day 1 with the U.S. dollar equivalents of the currencies disbursed to the borrowers under their loans, at the day's AERs for those currencies. These U.S. dollar equivalents will be the same as those charged to the individual Loan Accounts, viz., \$300,000 equivalent to Loan 3002, \$100,000 equivalent to Loan 3003 and \$100,000.00 to Loan 3004.

17. The Central Disbursement Account is debited with the currency amounts disbursed and their U.S. dollar equivalents at the day's AERs for those currencies. Accordingly, on Day 1, the Central Disbursement Account is debited with A 400,000.00 and \$200,000.00 equivalent for currency A, B 300,000.00 and \$100,000.00 equivalent for currency B, C 400,000.00 and \$100,000.00 equivalent for currency C, and \$100,000.00 for the U.S. dollar.

18. There being no further transactions on Day 1, closing balances are established for the Central Disbursement Account in currencies as well as in U.S. dollar equivalents, and for the Loan Accounts and Borrowers' Indebtedness Sub-Accounts in U.S. dollar equivalents alone. The Central Disbursement Account closing balances for Day 1 are A 400,000.00 (\$ 200,000.00 equivalent), B 300,000.00 (\$100,000.00 equivalent), C 400,000.00 (\$100,000.00 equivalent), and \$100,000.00, making up a total of \$500,000.00 equivalent for the Pool. The closing balances (undisbursed principal) for the individual Loan Accounts on Day 1 are: Loan 3001, \$2,000,000.00; Loan 3002, \$2,700,000.00; Loan 3003, \$3,900,000.00; and Loan 3004, \$4,900,000.00. The Day 1 closing balances for the individual Borrowers' Indebtedness Sub-Accounts are: Loan 3002, \$300,000.00 equivalent; Loan 3003, \$100,000.00 equivalent; and Loan 3004, \$100,000.00 equivalent making a total of \$500,000.00 equivalent. It will be observed that the

closing balance in U.S. dollar equivalent of the currencies outstanding in the Central Disbursement Account is equal to the total of the closing balances of the Borrowers' Indebtedness Sub-Accounts.

19. Once the closing balances for a day have been established, the Loan Share ratio for each loan is computed in order to determine the share of each loan in each of the currencies in the Pool. Based on the balance outstanding in the Borrowers' Indebtedness Sub-Account for each loan at the close of Day 1, the respective Loan Shares in the total Pool of \$500,000.00 equivalent are:

Loan 3002,  $\frac{\$300,000.00}{\$500,000.00} \times 100 = 60.000000000\%$ ; Loan 3003,  $\frac{\$100,000.00}{\$500,000.00} \times 100 = 20.000000000\%$ ; and Loan 3004,  $\frac{\$100,000}{\$500,000} \times 100 = 20.000000000\%$ .

20. Central to the currency pooling concept is the fact that each loan has a proportionate share in each currency in the Pool. Since all transactions in each currency have been translated into U.S. dollar equivalents at a single exchange rate, the closing balance of the Borrower's Indebtedness Sub-Account for a loan will represent the total U.S. dollar value of that loan's share of currencies in the Pool. Thus, at the close of Day 1, using the Loan Share ratios for that day, the distribution of currencies amongst the individual loans will be as shown in the table below:

Loan Share ratios	Loan 3002 (60.000000000%)			Loan 3003 (20.000000000%)		Loan 3004 (20.000000000%)		Pool (100.000000000%)	
	Day 1	Currency	US\$	Currency	US\$	Currency	US\$	Currency	US\$
	AER	Amount	Equiv.	Amount	Equiv.	Amount	Equiv.	Amount	Equiv.
Currency A	2.00	240,000	120,000	80,000	40,000	80,000	40,000	400,000	200,000
Currency B	3.00	180,000	60,000	60,000	20,000	60,000	20,000	300,000	100,000
Currency C	4.00	240,000	60,000	80,000	20,000	80,000	20,000	400,000	100,000
U.S. dollar	1.00	60,000	60,000	20,000	20,000	20,000	20,000	100,000	100,000
Totals			<u>300,000</u>	<u>100,000</u>		<u>100,000</u>		<u>500,000</u>	

21. The closing balances in currencies in the Central Disbursement Account for Day 1 are carried forward to Day 2 to form the opening currency balances for that day. In the illustration, the balances brought forward to Day 2 are: currency A, 400,000.00; currency B, 300,000.00; currency C, 400,000.00; and U.S. dollars, 100,000.00.

22. The opening currency balances in the Central Disbursement Account on Day 2 are valued at that day's AERs for the respective currencies to provide the revalued balance (U.S. dollar equivalents) for each currency and for the Pool. Thus, on Day 2, the respective opening balances in U.S. dollar equivalents for the four currencies are: currency A, 400,000.00 at AER 2.02 = \$198,019.80 equivalent; currency B, 300,000.00 at AER 2.98 = \$100,671.14 equivalent; currency C, 400,000.00 at AER 4.02 = \$99,502.49 equivalent; and U.S. dollars 100,000.00, making a revalued balance of \$498,193.43 equivalent for the Pool. The ratio of the total revalued U.S. dollar equivalent of the opening balance of currencies on Day 2 to the total U.S. dollar equivalent of the (same) closing balance of currencies for Day 1 is the Revaluation Factor for Day 2 and is calculated as  $\frac{\$498,193.43}{\$500,000.00} \times 100 = 99.638686096\%$ .

23. The revalued opening balances of the Borrowers' Indebtedness Sub-Accounts for Day 2 are determined by applying the Pool Revaluation Factor for Day 2 to the respective closing balances of the Borrowers' Indebtedness Sub-Accounts on Day 1 carried forward to Day 2. Thus, the revalued balances at the opening of Day 2 are: Loan 3002,  $\frac{99.638686096}{100} \times \$300,000.00 = \$298,916.05$ ; Loan 3003,  $\frac{99.638686096}{100} \times \$100,000.00 = \$99,638.69$ ; and Loan 3004,  $\frac{99.638686096}{100} \times \$100,000.00 = \$99,638.69$ , making a total of \$498,193.43 for all the loans. Since the currency composition of the individual loans is identical to that of

the Central Disbursement Account and remains unchanged from the close of one day to the opening of the next, the revalued opening balance in the Borrower's Indebtedness Sub-Account for a loan will correctly reflect the total of the revalued U.S. dollar equivalents of that loan's share of currencies in the Pool, as shown below.

	Day 2 AER	Loan 3002		Loan 3003		Loan 3004		Pool	
		Currency Amount	US\$ Equiv.	Currency Amount	US\$ Equiv.	Currency Amount	US\$ Equiv.	Currency Amount	US\$ Equiv.
Currency A	2.02	240,000	118,811.88	80,000	39,603.96	80,000	39,603.96	400,000	198,019.80
Currency B	2.98	180,000	60,402.68	60,000	20,134.23	60,000	20,134.23	300,000	100,671.14
Currency C	4.02	240,000	59,701.49	80,000	19,900.50	80,000	19,900.50	400,000	99,502.49
U.S. dollar	1.00	60,000	60,000.00	20,000	20,000.00	20,000	20,000.00	100,000	100,000.00
Totals			<u>298,916.05</u>		<u>99,638.69</u>		<u>99,638.69</u>		<u>498,193.43</u>

24. For principal repayments it is necessary first to determine the value of the repayment on the due date. This is done by application of the Amortization Adjustment Factor (determined as described in paragraph 11. above) to the amount of the maturity in withdrawal terms. Thus, Loan 3002 has a maturity of \$100,000.00 in withdrawal terms due on Day 4. The Amortization Adjustment Factor for Loan 3002 on Day 4 is 99.403730992%. The value of the maturity in current dollar terms on Day 4 is therefore  $\frac{\$100,000 \times 99.403730992}{100} = \$99,403.73$ . After designation of the currency in which the maturity is to be requested from the Borrower, the current dollar value of 99,403.73 must be translated into its equivalent amount in the designated currency using the AER of the due date. In the example, the currency designated for the repayment by the Borrower is currency A. The

Borrower's obligation for the maturity is therefore  $\$99,403.73 \times \text{AER } 2.06 =$  A 204,771.69. On the due date, this amount and its dollar equivalent of 99,403.73 are credited to the Central Disbursement Account, the Borrower's Indebtedness Sub-Account for Loan 3002 is credited with \$99,403.73, and the Withdrawals Outstanding are reduced by \$100,000.00, the value of the maturity in withdrawal terms.

25. The procedures described in the preceding paragraphs will continue to be applied from one day to the next in the operation of the Currency Pooling System.

Revaluation Factors, Cumulative Revaluation Factors and Amortization Adjustment Factors - Table 3

26. In the preceding paragraphs, mention has been made of the Revaluation Factor and the Amortization Adjustment Factor and the application of each in the Currency Pooling operation. The remaining paragraphs of this Technical Illustration are devoted to an explanation of the relationship between these two factors.

27. Table 3 illustrates how the daily Amortization Adjustment Factors for each loan are derived from the Pool Revaluation Factors and the principal amounts of the transactions under each loan. The first part of this table displays the cumulative revaluation factor for each transaction day (horizontal) at the beginning of each succeeding day (vertical). Thus, the first figure of 99.638686096% under Day 1 is the cumulative revaluation factor for Day 1 transactions on Day 2. Since Day 1 was the first day of the Pool, this factor is nothing but the Revaluation Factor for Day 2. The second figure of 99.414187179% under Day 1 is the cumulative revaluation factor for Day 1 transactions on Day 3. It is obtained by multiplying the Revaluation Factor

for Day 2 by that for Day 3, thus  $99.638686096\% \times 99.774686995\% = 99.414187179\%$ . Successive multiplications of the daily Revaluation Factors in this fashion through the beginning of Day 7 produce the cumulative revaluation factor of  $99.214480291\%$  for Day 1 transactions on Day 7. For the succeeding transaction Days, 2 through 6, the procedure is the same, the first figure in the multiplication chain for each transaction day being the Revaluation Factor for the day following.

28. The second part of Table 3 shows how the cumulative revaluation factors can be applied to the daily transaction totals, at their transaction values, to derive the current value of the principal outstanding in the Borrower's Indebtedness Sub-Account. To take an example, Loan 3001 had two transactions, the first a disbursement of \$100,000.00 equivalent on Day 2, and the second a disbursement of \$200,000.00 equivalent on Day 6. The value of the Borrower's total principal obligation on Day 7 is derived as follows:

$$\begin{aligned} & \text{(Day 2 transaction x cumulative revaluation factor for Day 2} \\ & \quad \text{transactions on Day 7)} \\ + & \\ & \text{(Day 6 transaction x cumulative revaluation factor for Day 6} \\ & \quad \text{transactions on Day 7)}. \end{aligned}$$

Numerically, this translates to:

$$\begin{aligned} & (100,000.00 \times 99.574255922\%) + (200,000.00 \times 99.879282723\%) \\ & = \$99,574.26 + \$199,758.56 \\ & = \$299,332.82. \end{aligned}$$

29. The Amortization Adjustment Factor, as defined earlier, is the ratio of the opening balance of the Borrower's Indebtedness Sub-Account to the Withdrawals Outstanding. In Table 3, the Amortization Adjustment Factors have

been computed daily for each loan from the daily figures for Principal Outstanding and Withdrawals Outstanding.

30. From the foregoing, it will have been observed that the Amortization Adjustment Factor for a loan on any day is simply the weighted average cumulative revaluation factor for that loan up to that day, using the transaction values as weights. For example, the Amortization Adjustment Factor for Loan 3001 on Day 7 is  $\frac{\$299,332.82}{\$300,000.00} \times 100 = 99.777607123\%$ . (Note: The exact figure for the Amortization Adjustment Factor has been computed on the basis of principal amounts expressed in U.S. dollar equivalents to the sixth decimal place.) This result can be expanded to

$$\frac{(100,000.00 \times 99.574255922\%) + (200,000.00 \times 99.879282723\%)}{300,000.00}$$

from the derivation in paragraph 28. above. The percentages in the numerator of this expression are the cumulative revaluation factors for the respective transactions on Day 7, and the amounts of 100,000.00 and 200,000.00 are the transaction values, effectively the weights.

Attachments:

SSubramanian/MHattori/amd MH#6:B20-30



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Currency Pooling System  
Central Disbursement Account

	Pool (Revaluation Factor %) a/	Dollar Equivalents				Currencies			
		A (AER)	B (AER)	C (AER)	\$	A	B	C	S
Day 1		(2.00)	(3.00)	(4.00)	(1.00)				
Opening Balance									
Repayments									
Disbursements	500,000.00	200,000.00	100,000.00	100,000.00	100,000.00	400,000.00	300,000.00	400,000.00	100,000.00
Closing Balance	500,000.00	200,000.00	100,000.00	100,000.00	100,000.00	400,000.00	300,000.00	400,000.00	100,000.00
Day 2	(99.638686096)	(2.02)	(2.98)	(4.02)	(1.00)				
Opening Balance	498,193.43	198,019.80	100,671.14	99,502.49	100,000.00	400,000.00	300,000.00	400,000.00	100,000.00
Repayments									
Disbursements	200,000.00		100,000.00	100,000.00			298,000.00	402,000.00	
Closing Balance	698,193.43	198,019.80	200,671.14	199,502.49	100,000.00	400,000.00	598,000.00	802,000.00	100,000.00
Day 3	(99.774686995)	(2.04)	(2.96)	(4.04)	(1.00)				
Opening Balance	696,620.31	196,078.43	202,027.03	198,514.85	100,000.00	400,000.00	598,000.00	802,000.00	100,000.00
Repayments									
Disbursements	200,000.00	100,000.00	100,000.00			204,000.00	296,000.00		
Closing Balance	896,620.31	296,078.43	302,027.03	198,514.85	100,000.00	604,000.00	894,000.00	802,000.00	100,000.00
Day 4	(99.799486148)	(2.06)	(2.94)	(4.06)	(1.00)				
Opening Balance	894,822.46	293,203.88	304,081.63	197,536.95	100,000.00	604,000.00	894,000.00	802,000.00	100,000.00
Repayments	-99,403.73	-99,403.73				-204,771.69			
Disbursements	100,000.00		100,000.00				294,000.00		
Closing Balance	895,418.73	193,800.15	404,081.63	197,536.95	100,000.00	399,228.31	1,188,000.00	802,000.00	100,000.00
Day 5	(99.992841457)	(2.08)	(2.92)	(4.08)	(1.00)				
Opening Balance	895,354.63	191,936.69	406,849.31	196,568.63	100,000.00	399,228.31	1,188,000.00	802,000.00	100,000.00
Repayments									
Disbursements	200,000.00		200,000.00				584,000.00		
Closing Balance	1,095,354.63	191,936.69	606,849.31	196,568.63	100,000.00	399,228.31	1,772,000.00	802,000.00	100,000.00
Day 6	(100.127659832)	(2.10)	(2.90)	(4.10)	(1.00)				
Opening Balance	1,096,752.96	190,108.72	611,034.48	195,609.76	100,000.00	399,228.31	1,772,000.00	802,000.00	100,000.00
Repayments	-99,875.57		-99,875.57				-289,639.15		
Disbursements	300,000.00	200,000.00		100,000.00		420,000.00		410,000.00	
Closing Balance	1,296,877.39	390,108.72	511,158.91	295,609.76	100,000.00	819,228.31	1,482,360.85	1,212,000.00	100,000.00
Day 7	(99.879282723)	(2.12)	(2.88)	(4.12)	(1.00)				
Opening Balance	1,295,311.83	386,428.45	514,708.63	294,174.75	100,000.00	819,228.31	1,482,360.85	1,212,000.00	100,000.00

Note:

a/ Revaluation factors have been computed to eleven decimal places but rounded to the ninth decimal place for display purposes. Loan shares have been computed and are displayed to nine decimal places. The computations of both these ratios have been based on principal amounts expressed in U.S. dollar equivalents to the sixth decimal place.

Controller's  
January 25, 1980

Currency Pooling System

Loan Accounts, Withdrawals Outstanding and Borrowers' Indebtedness Sub-Accounts

(Amounts in U.S. dollar equivalents)

	Pool	Loan 3001			Loan 3002			Loan 3003			Loan 3004		
	(Revaluation Factor %) <sup>a/</sup>	Loan Account (2,000,000.00)	Withdrawals Outstanding	Principal Outstanding	Loan Account (3,000,000.00)	Withdrawals Outstanding	Principal Outstanding	Loan Account (4,000,000.00)	Withdrawals Outstanding	Principal Outstanding	Loan Account (5,000,000.00)	Withdrawals Outstanding	Principal Outstanding
Day 1				(Amortization Adjustment Factor %) <sup>b/</sup>									
Opening Balance		2,000,000.00			3,000,000.00			4,000,000.00			5,000,000.00		
Repayments													
Disbursements	500,000.00				-300,000.00	300,000.00	300,000.00	-100,000.00	100,000.00	100,000.00	-100,000.00	100,000.00	100,000.00
Closing Balance	500,000.00	2,000,000.00		(Loan Share %) <sup>a/</sup>	2,700,000.00	300,000.00	300,000.00	3,900,000.00	100,000.00	100,000.00	4,900,000.00	100,000.00	100,000.00
							(60.000000000)			(20.000000000)			(20.000000000)
Day 2	(99.638686096)						(99.638686096)			(99.638686096)			(99.638686096)
Opening Balance	498,193.43	2,000,000.00			2,700,000.00	300,000.00	298,916.05	3,900,000.00	100,000.00	99,638.69	4,900,000.00	100,000.00	99,638.69
Repayments													
Disbursements	200,000.00	-100,000.00	100,000.00	100,000.00	-100,000.00	100,000.00	100,000.00	3,900,000.00	100,000.00	99,638.69	4,900,000.00	100,000.00	99,638.69
Closing Balance	698,193.43	1,900,000.00	100,000.00	100,000.00	2,600,000.00	400,000.00	398,916.05			14.270928620			14.270928620
				(14.322678449)			(57.135464311)						(14.270928620)
Day 3	(99.774686995)						(99.504312133)			(99.414187179)			(99.414187179)
Opening Balance	696,620.31	1,900,000.00	100,000.00	99,774.68	2,600,000.00	400,000.00	398,017.25	3,900,000.00	100,000.00	99,414.19	4,900,000.00	100,000.00	99,414.19
Repayments													
Disbursements	200,000.00				-100,000.00	100,000.00	100,000.00	-100,000.00	100,000.00	100,000.00	4,900,000.00	100,000.00	99,414.19
Closing Balance	896,620.31	1,900,000.00	100,000.00	99,774.68	2,500,000.00	500,000.00	498,017.25	3,800,000.00	200,000.00	199,414.19	4,900,000.00	100,000.00	99,414.19
				(11.127863812)			(55.543828646)			(22.240650249)			(11.087657293)
Day 4	(99.799486148)						(99.403730992)			(99.507167055)			(99.214847962)
Opening Balance	894,822.46	1,900,000.00	100,000.00	99,574.62	2,500,000.00	500,000.00	497,018.66	3,800,000.00	200,000.00	199,014.33	4,900,000.00	100,000.00	99,214.85
Repayments	-99,403.73 <sup>c/</sup>					-100,000.00	-99,403.73						
Disbursements	100,000.00							-100,000.00	100,000.00	100,000.00	4,900,000.00	100,000.00	99,214.85
Closing Balance	895,418.73	1,900,000.00	100,000.00	99,574.62	2,500,000.00	400,000.00	397,614.93	3,700,000.00	300,000.00	299,014.33	4,900,000.00	100,000.00	99,214.85
				(11.120453672)			(44.405473004)			(33.393799397)			(11.080273927)
Day 5	(99.992841457)						(99.396614630)			(99.664309680)			(99.207745625)
Opening Balance	895,354.63	1,900,000.00	100,000.00	99,567.50	2,500,000.00	400,000.00	397,586.46	3,700,000.00	300,000.00	298,992.93	4,900,000.00	100,000.00	99,207.74
Repayments													
Disbursements	200,000.00				-100,000.00	100,000.00	100,000.00	-100,000.00	100,000.00	100,000.00	4,900,000.00	100,000.00	99,207.74
Closing Balance	1,095,354.63	1,900,000.00	100,000.00	99,567.50	2,400,000.00	500,000.00	497,586.46	3,600,000.00	400,000.00	398,992.93	4,900,000.00	100,000.00	99,207.74
				(9.089978178)			(45.426973592)			(36.425913408)			(9.057134822)
Day 6	(100.127659832)						(99.644335311)			(99.875570686)			(99.334394067)
Opening Balance	1,096,752.96	1,900,000.00	100,000.00	99,694.61	2,400,000.00	500,000.00	498,221.68	3,600,000.00	400,000.00	399,502.28	4,900,000.00	100,000.00	99,334.39
Repayments	-99,875.57 <sup>d/</sup>								-100,000.00	-99,875.57			
Disbursements	300,000.00	-200,000.00	200,000.00	200,000.00	-100,000.00	100,000.00	100,000.00	3,600,000.00	300,000.00	299,626.71	4,900,000.00	100,000.00	99,334.39
Closing Balance	1,296,877.39	1,700,000.00	300,000.00	299,694.61	2,300,000.00	600,000.00	598,221.68			(23.103704046)			(7.659505433)
				(23.108938986)			(46.127851535)						
Day 7	(99.879282723)						(99.583253273)			(99.755004190)			(99.214480291)
Opening Balance	1,295,311.83	1,700,000.00	300,000.00	299,332.82	2,300,000.00	600,000.00	597,499.52	3,600,000.00	300,000.00	299,265.01	4,900,000.00	100,000.00	99,214.48

Notes:

<sup>a/</sup> Revaluation factors have been computed to eleven decimal places but rounded to the ninth decimal place for display purposes. Loan shares have been computed and are displayed to nine decimal places. The computations of both these ratios have been based on principal amounts expressed in U.S. dollar equivalents to the sixth decimal place.

<sup>b/</sup> Amortization Adjustment Factors have been computed and are displayed to the ninth decimal place. These computations have been based on principal amounts expressed in U.S. dollar equivalents to the sixth decimal place.

<sup>c/</sup> Maturity of 100,000.00 on Loan 3002; A 204,771.69 (\$99,403.73) recalled.

<sup>d/</sup> Maturity of 100,000.00 on Loan 3003; B 289,639.15 (\$99,875.57) recalled.

Currency Pooling System  
Revaluation Factors and Amortization Adjustment Factors  
(Amounts in U.S. dollar equivalents)

	<u>Day 1</u>	<u>Day 2</u>	<u>Day 3</u>	<u>Day 4</u>	<u>Day 5</u>	<u>Day 6</u>
I. <u>Revaluation Factors and Cumulative Revaluation Factors (%) a/</u>						
Day 2	99.638686096					
Day 3	99.414187179	99.774686995				
Day 4	99.214847962	99.574624927	99.799486148			
Day 5	99.207745625	99.567496835	99.792341959	99.992841457		
Day 6	99.334394067	99.694604534	99.919736695	100.120492151	100.127659832	
Day 7	99.214480291	99.574255922	99.799116310	99.999629419	100.006788448	99.879282723

							<u>Opening Balances</u>		<u>Amortization</u>	
							<u>Principal</u>	<u>Withdrawals</u>	<u>Adjustment</u>	
							<u>Outstanding</u>	<u>Outstanding</u>	<u>Factor (%) b/</u>	
II. <u>Principal Transactions, and Amortization Adjustment Factors (%)</u>										
<u>Loan 3001 Principal Transactions</u>										
Revalued opening balance								200,000.00		
(transactions and daily total)										
Day 3		100,000.00					99,774.68	100,000.00	99.774686995	
Day 4		99,774.68					99,574.62	100,000.00	99.574624927	
Day 5		99,574.62					99,567.50	100,000.00	99.567496835	
Day 6		99,567.50					99,694.61	100,000.00	99.694604534	
Day 7		99,694.61				199,758.56	299,332.82	300,000.00	99.777607123	
		99,574.26								
<u>Loan 3002 Principal Transactions</u>										
Revalued opening balance							300,000.00	100,000.00	100,000.00	
(transactions and daily total)										
Day 2		298,916.05					298,916.05	300,000.00	99.638686096	
Day 3		298,242.56	99,774.68				398,017.25	400,000.00	99.504312133	
Day 4		297,644.54	99,574.62	99,799.49			497,018.66	500,000.00	99.403730992	
Day 5		297,623.24	99,567.50	99,792.34	-99,396.62		397,586.46	400,000.00	99.396614630	
Day 6		298,003.18	99,694.61	99,919.74	-99,523.51	100,127.66	498,221.68	500,000.00	99.644335311	
Day 7		297,643.44	99,574.26	99,799.12	-99,403.36	100,006.79	597,499.52	600,000.00	99.583253273	
<u>Loan 3003 Principal Transactions</u>										
Revalued opening balance							100,000.00		100,000.00	-99,875.57
(transactions and daily total)										
Day 2		99,638.69					99,638.69	100,000.00	99.638686096	
Day 3		99,414.19					99,414.19	100,000.00	99.414187179	
Day 4		99,214.85		99,799.49			199,014.33	200,000.00	99.507167055	
Day 5		99,207.74		99,792.34	99,992.84		298,992.93	300,000.00	99.664309680	
Day 6		99,334.39		99,919.74	100,120.49	100,127.66	399,502.28	400,000.00	99.875570686	
Day 7		99,214.48		99,799.12	99,999.63	100,006.79	299,265.01	300,000.00	99.755004190	
<u>Loan 3004 Principal Transactions</u>										
Revalued opening balance							100,000.00			
(transactions and daily total)										
Day 2		99,638.69					99,638.69	100,000.00	99.638686096	
Day 3		99,414.19					99,414.19	100,000.00	99.414187179	
Day 4		99,214.85					99,214.85	100,000.00	99.214847962	
Day 5		99,207.74					99,207.74	100,000.00	99.207745625	
Day 6		99,334.39					99,334.39	100,000.00	99.334394067	
Day 7		99,214.48					99,214.48	100,000.00	99.214480291	

Notes:

a/ Revaluation Factors and Cumulative Revaluation Factors have been computed to eleven decimal places but rounded to the ninth decimal place for display purposes. The computations of the Revaluation Factors have been based on principal amounts expressed in U.S. dollar equivalents to the sixth decimal place.

b/ Amortization Adjustment Factors have been computed and are displayed to the ninth decimal place. These computations have been based on principal amounts expressed in U.S. dollar equivalents to the sixth decimal place.

Amounts may not add across due to rounding.

Controller's  
January 25, 1980

## OFFICE MEMORANDUM

TO: Mr. Robert S. McNamara

FROM: Eugene H. Rotberg *ER*

SUBJECT: Cost of IBRD Borrowings

DATE February 5, 1980

In the attached paper we analyze the "real" cost of the Bank's total borrowings of Swiss francs, Deutsche mark and Yen since FY78 and compare such costs to a range of potential future exchange rate developments over the life of these "hard currency" borrowings. We assume, in particular, that the dollar will depreciate in varying degrees against each of such currencies through 1999 - the year by which all of the hard currency borrowings will have matured. We also determined what the cost of a hypothetical dollar borrowing program would have been had we substituted a corresponding dollar borrowing for each of the non-dollar currency borrowings in this period. The sensitivity tests are summarized in the text of the memorandum and on four graphs where the dollar-based (real) cost of the borrowing program since FY78 is plotted versus the final exchange rate for each of the three non-dollar currencies, and for the aggregate stream of such currencies. Three points of interest are also indicated on each plot: the case in which future exchange rates remain constant (Point A); the case reflecting the final exchange rate level for which the hard currency borrowing cost breaks even with the cost of the corresponding hypothetical dollar borrowings (Point B); and the case reflecting the borrowing cost if exchange rates were to reach the level currently implied by the long-term capital yield differentials between the dollar and each of the hard currencies (Point C).

The paper discusses the "real cost" of borrowings to the Bank implying that the analytical results also reflect the impact of such cost on our borrowers, i.e. to the system. The paper technically does not discuss the "real costs" actually assumed by our borrowers, i.e. our disbursement policy. That matter will be discussed at meetings that Moeen and I have scheduled with the Executive Directors. For the most part, we have relatively little flexibility with respect to our disbursements (even assuming we had a view amongst alternative currencies which were likely to appreciate or depreciate over the next 6 months to 15 years) since virtually most, if not all, of the capital-exporting countries have imposed quite stringent requirements on our disbursement versus investment policies as a condition to our borrowing. Our flexibility to choose what currency to disburse is also limited by the Bank's debt servicing obligations which have a considerable effect on whether we hold a particular currency in order to fulfill such obligations or disburse it. Finally, and most important, a paper on disbursement policies would have to encompass the whole range of issues concerning "income targets" since, even to the extent that we have flexibility, a balance must be struck between what is in the interest of our borrowers--assuming we knew what that was--and the quite certain effect on our reported income and reserves of a policy which ignored such matters. And any "advantage" to our borrowers, to the extent it adversely affected the Bank, would have to be made up somehow--probably by an increase in the lending rate. It is far better that, if "excess" income develops for whatever reason, the Bank allocate that "excess" for the best interest of our borrowers after it is earned.

Mr. Robert S. McNamara

- 2 -

February 5, 1980

Nonetheless, the fact is that, despite all of this, our disbursements have not been out of line with our borrowings. See the Table (on the page following) which is not incorporated into the text.

I have circulated the draft paper to Moeen, PAB and Jack Polak for their comments. The data and analyses were developed by Hans Hittmair and Adnan Akant of our Investment Division.

Attachments

EHRotberg:emk

## Disbursements and Borrowings \*)

(In Millions of US\$ Equivalent)

	Japanese Yen		Deutsche Mark		US-Dollars		Swiss Francs	
	Amount Disbursed	Amount Borrowed	Amount Disbursed	Amount Borrowed	Amount Disbursed	Amount Borrowed	Amount Disbursed	Amount Borrowed
FY 1978								
1st half	393.2	392.1	439.0	501.6	156.2	750.0	257.0	220.3
2nd half	351.4	-	439.3	233.4	201.3	-	235.2	149.3
FY 1979								
1st half	222.1	876.7	113.4	648.2	95.3	-	1,142.6	1,430.7
2nd half	954.1	-	214.5	-	151.2	-	552.0	58.1
FY 1980								
1st half	343.3	1,014.8	1,015.5	1,536.4	195.8	-	483.6	630.1
Total:	2,264.1	2,283.6	2,221.7	2,919.6	799.8	750.0	2,670.4	2,488.5

\*) Excluding Central Bank Rollovers

DRAFT

HCHittmair/AAkant/EHRotberg:mb

February 4, 1980

COST OF IBRD BORROWINGS

1. This memorandum is addressed to the "real cost" of the Bank's borrowings of hard currencies (Swiss franc, German mark and Japanese yen) and whether a policy of greater currency diversification including, in particular, borrowings in U.S. dollars would have been more advantageous to the Bank and its borrowers. In the Board Meeting of January 15, 1980 a request was made for an analysis of the "real cost" of our borrowings which included the effects of exchange rate fluctuations. The following paper analyzes the total cost of Bank borrowings for the period from mid-1977 through January 1980.

2. The review concentrates on the Bank's market operations in Swiss franc, German mark, Japanese yen and U.S. dollars between July 1, 1977 and January 28, 1980. The borrowing operations analyzed total \$8.7 billion equivalent or 71% of total borrowings during this period after excluding (a) central bank re-financing operations in U.S. dollars, German mark and Japanese yen, (b) borrowings from the Third Window, and (c) borrowings denominated in currencies other than the four noted above. Attachment 1 shows the currency breakdown of this amount by half-yearly periods and fiscal years. The total summarizes 70 individual borrowing operations: 28 in Swiss franc, 27 in German mark, 14 in Japanese yen and one in U.S. dollars.

3. The dollar borrowing included in the attachment occurred in July 1977 at the very beginning of the period analyzed. In the 2-1/2 years since then the Bank has not borrowed in the U.S. market (or in U.S. dollars from other sources) primarily because the nominal cost advantages resulting

from borrowing in the three hard currencies rather than in U.S. dollars appeared to offset the potential costs of the foreign exchange risk involved.

4. The assessment of the foreign exchange rate risk exposure for each individual borrowing operation is a matter of judgment. However, in order to provide some basis for quantification of that risk a break-even point calculation has been used since early 1977 for the Bank's borrowing operations which compares the cost of hard currency borrowings with hypothetical dollar borrowings of equal maturity, and which calculates by how much the dollar would have to depreciate in value over the life of the borrowing in order to offset the nominal cost of the hypothetical dollar alternative. As long as the actual depreciation of the dollar remains less than the break-even point during the life of the loan the non-dollar borrowing is justified in dollar cost terms. Conversely if the actual dollar depreciation exceeds the break-even point this indicates that borrowing dollars would have been preferable - assuming such dollar borrowings were available.

5. Attachment 2 shows individual break-even point calculations for each Swiss franc, German mark and Japanese yen borrowing during the period under review which is included in this analysis. The data indicate relatively narrow break-even point margins at the time of the borrowings at the beginning of the period under study and much larger break-even margins later in the period when most of the Swiss franc, German mark and Japanese yen borrowings were executed.

6. Care has to be taken in interpreting these results. A judgment whether the Bank was "right" or "wrong" with respect to a particular borrowing cannot yet be determined with certainty. Further and more



important are the constraints which apply to our borrowing operations. For example, it would appear that the Bank's decision to borrow German mark in the first half of FY78 has proven to be costly because the dollar depreciation since then has exceeded the original break-even point calculation. It would therefore seem that the Bank should have, alternatively, borrowed dollars. In fact this was not possible. The Bank had just borrowed in April/May 1977 \$600 million in the U.S. market and repeated a U.S. dollar operation in July/August 1977 for an additional \$750 million. It would not have been possible for market technical reasons to borrow additional funds in the U.S. market. As a result the alternative of borrowing dollars was then no longer available and other currencies had to be considered in order to fulfil the requirements of the borrowing program.<sup>1/</sup>

7. The comparison between the dollar depreciation up to a certain date and the break-even point offers the opportunity for an assessment of the "real cost" as of the date of the review - with hindsight. However, in order to assess the alternative cost of borrowing dollars, clearly an option available to the Bank in the last 2-1/2 years, and, further, to assess the range of potential costs for the future, the following analyses were undertaken:

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<sup>1/</sup> It is also worth noting that in the preceding three years FY75 to FY77, the Bank borrowed \$5.5 billion in the U.S. market and from OPEC sources, equivalent to about 65% of total market borrowings (\$8.5 billion). During much of this period interest rates in the U.S. market and in the Swiss and German market were much closer than now. The Japanese market was closed altogether to foreign issuers during this period. In this situation the Bank therefore borrowed the maximum amount possible in U.S. dollars and supplemented these borrowings to the extent necessary to complete its program by borrowing Swiss francs and German mark.

(a) Currency cash flow - For each of the 69 borrowing operations a cash flow was prepared taking as borrowing receipts the face value of the borrowed amounts while for the debt service (cash outflow) the total cost of each transaction was annualized over the life of the borrowing. The cash flows were then aggregated by currency and the internal rate of return of the resulting net cash streams calculated. The internal rate of return is equivalent to the consolidated cost of borrowings by currency, giving appropriate weight to the amount, timing and maturity structure of each borrowing operation.

(b) Dollar equivalent cash flow - The net currency cash flows were then converted into U.S. dollars at historic exchange rates. Attachment 3 shows the average exchange rates used for these conversions, with the rates as of 1/28/80 assumed to apply for the second half of 1980; an index figure shows how the interest rates have varied from the level in FY78/I which is given as 100. For future exchange rates a sensitivity analysis was done assuming exchange rate movements from a 20% dollar appreciation to a 70% dollar depreciation to produce a series of dollar equivalent cash streams for which the internal rates of return were also calculated. These rates of return when compared to those of the currency cash flows measure the additional cost due solely to foreign exchange rate fluctuations.

(c) Hypothetical dollar equivalent cash flows - In order to show the hypothetical cost burden for the Bank if it had borrowed dollars instead of the above currencies a further series of cash flows was prepared substituting for each borrowing in Swiss franc, German mark and Japanese yen an equivalent dollar borrowing with an identical maturity and a dollar market related interest rate at the time of each such borrowing. The

dollar market rate was established by adding a 50 basis point average spread (plus the appropriate underwriting cost) to the cost of a U.S. Treasury obligation of comparable maturity - a spread considerably below the recent yields of Bank obligations.

9. The following table summarizes the computations for the cash flows described in points (a) and (c) of the previous paragraphs for the 2-1/2 year borrowing period:

Table 1

Internal rate of return calculations for currency and hypothetical dollar equivalent cash flows from FY78 onward <sup>1/</sup>

<u>Currency</u>	<u>Currency Cash Flow (nominal cost)</u>	<u>Hypothetical U.S. dollar borrowings</u>	<u>Basis point spread</u>
Sw F	4.50%	9.28%	478
DM	7.16%	9.49%	233
¥	7.69%	9.46%	177
Weighted average <sup>2/</sup>	6.44	9.41	297

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<sup>1/</sup> For a description of the cash flows and other assumptions used in these calculations see paragraph 7 (a) and (c)

<sup>2/</sup> Average cost weighted by amount of borrowings expressed in dollar equivalents

The figures in this table show that the nominal financial cost of borrowing U.S. dollars instead of Swiss franc, German mark and Japanese yen during the past 2-1/2 years would have been 297 basis points or 46% higher, corresponding to an actual additional cost of about \$235 million per year for the life of the debt under review. These computations are not subject to foreign exchange rate fluctuations.

10. In order to establish the "real cost" of the Bank's borrowings including foreign exchange movements a sensitivity analysis described in paragraph 7(b) was done and its results are shown in Attachment 4.

The calculations can be summarized as follows:

Table 2

Internal rate of return calculations for \$-equivalent cash flows from FY78 onward (sensitivity analysis of real cost)<sup>1/</sup>

<u>Currency</u>	<u>\$ depreciation against currency (in %)</u>							
	<u>0</u>	<u>10</u>	<u>20</u>	<u>30</u>	<u>40</u>	<u>50</u>	<u>60</u>	<u>70</u>
1. <u>Sw F</u>								
Real cost (%)	5.81	6.26	6.73	7.22	7.73	8.26	8.83	9.42
Sw F/\$ rate (Sw F)	1.62	1.46	1.29	1.13	0.97	0.81	0.65	0.48
2. <u>DM</u>								
Real cost (%)	8.98	9.46	9.96	10.49	11.05	11.65	12.29	12.99
DM/\$ rate (DM)	1.74	1.56	1.39	1.22	1.04	0.87	0.69	0.52
3. <u>¥</u>								
Real cost (%)	6.83	7.34	7.88	8.47	9.12	9.84	10.66	11.61
¥/\$ rate (¥)	240	216	192	168	144	120	96	72
4. <u>Aggregate real cost (%)</u>	7.35	7.83	8.34	8.88	9.46	10.09	10.78	11.55

<sup>1/</sup> For cash flow description and other assumptions used see paragraph 7(B) and Attachment 4

The above table assumes different linear depreciation rates of the dollar (0 to 70%) from now through FY99 which is the last year of the underlying cash flows.

It shows the real cost related to these depreciation rates e.g. a 30% depreciation of the dollar against the Swiss franc from Sw F 1.62/\$ now to Sw F 1.13/\$ by FY99 would increase the "real cost" of the Swiss franc borrowings from 5.81% to 7.22%. It should be noted that foreign exchange rate movements usually do not occur in linear form but rather in quantum jumps. However it was not found possible to propose any generally acceptable assumptions concerning the frequency or amount of such movements and the

linear increases in rates was therefore used for the purposes of the sensitivity analysis.

11. The graphs in Attachment 4 illustrate specific ranges of the above dollar depreciation assumptions covering three specific points:

Point A - assumes constant exchange rates for the future, i.e. the rates prevailing as of January 28, 1980.

Point B - represents a break-even point calculation determining the dollar depreciation rate which would be necessary from January 28, 1980 to equalize real costs and hypothetical dollar costs over the life of the remaining cash flow for each currency.

Point C - shows the level of exchange rates implied in long term capital interest rate differentials. This market-implied forecast of foreign exchange rates has not offered a reliable forecast on foreign exchange rates based on past experience.

The following table summarizes the results:

Table 3

Internal rate of return calculations for specific \$ depreciation rates included in Table 2

<u>Currency</u>	<u>Point A</u>	<u>Point B</u>	<u>Point C</u>
1. <u>Sw F</u>			
Real cost (%)	5.81	9.28	9.07
Sw F/\$ rate (Sw F)	1.62	.53	.58
Range of \$ depreciation assumed (%)	0	60-70	60-70
2. <u>DM</u>			
Real cost (%)	8.98	9.49	11.0
DM/\$ rate (DM)	1.74	1.55	1.06
Range of \$ depreciation assumed (%)	0	10-20	30-40
3. <u>¥</u>			
Real cost (%)	6.83	9.46	8.88
¥/\$ rate (¥)	240	133	153
Range of \$ depreciation assumed (%)	0	40-50	30-40
4. <u>Aggregate real cost (%)</u>	7.35	9.42	9.71

12. The margins of further dollar depreciation from current rates which would equalize the total cost burden of borrowing Swiss franc, German mark and Japanese yen versus hypothetical U.S. dollars from now on through the remaining life of the borrowings analyzed, differ between the three currencies as follows:

Dollar depreciation in currency terms required to equalize real cost and hypothetical dollar cost

Currency

Sw F	67.3%
DM	10.9%
¥	44.5%
Aggregate	39.3%

While the margins for Swiss francs and Japanese yen appear substantial the German mark margins appear tight. For the most part, this is due to the fact that the early German mark borrowings in FY78 were always marginal from the point of view of their total cost including the foreign exchange risk exposure, given their rather low revaluation break-even point at the time. The decision to proceed with them was based on considerations concerning availability constraints described earlier. Further, it is appropriate to note that the future dollar depreciation required to equalize the real cost and hypothetical dollar cost viz., 67.3%, 10.9%, and 44.5% for Swiss franc, German mark and Japanese yen respectively have no relevance to determining whether a new borrowing in one of these currencies at any particular break-even point is or is not appropriate.

13. In summary, the Bank's borrowings of Swiss franc, German mark and Japanese yen during the period FY78 through mid-FY80 has not produced to date a real cost burden as compared to the cost of borrowing U.S. dollars instead. Indeed a further substantial depreciation of the dollar would be required to equalize such costs. However, such a depreciation while

it may yet occur is not being predicted as it would have to be accompanied by major economic changes which are not susceptible to normal forecasting. Thus in those cases where the Bank had a reasonable choice to borrow dollars or Swiss franc, German mark or Japanese yen and this applied to most of the period under review, the decisions to borrow hard currencies at lower nominal costs still appear justified under any set of reasonable assumptions on future foreign exchange rate developments between these currencies and the dollar. Currency diversification would not have achieved better results and the substantial borrowings of U.S. dollars even assuming that they could have been absorbed in the market would have led to substantial additional cost burdens. Such borrowings would only be justified for reasons other than cost. Indeed, despite rather wide break-even point margins and a very high nominal cost in U.S. dollars which would continue to support non-dollar borrowings, we expect to bring to the Board of Executive Directors substantial U.S. dollar borrowings in the future because of the size of the overall program and the need to avoid saturating any one particular market.

ATTACHMENT 1

IBRD BORROWINGS: FY78-FY80 (1/28/79)  
(excluding central bank rollovers)

Fiscal years	DM		Sw F		¥		\$	Total
	DM	\$ equiv.	Sw F	\$ equiv.	¥	\$ equiv.		\$ equiv.
-----in millions of currency units-----								
1978 I	1,150	501.6	525	220.3	100,000	392.1	750	1,864.0
II	500	233.4	300	149.3	-	-	-	382.7
Sub-total	1,650	735.0	825	369.6	100,000	392.1	750	2,246.7
%		32.7		16.4		17.5	33.4	100.0
1979 I	1,300	648.2	2,400	1,430.7	175,000	876.7		2,955.6
II	-	-	100	58.1	-	-		58.1
Sub-total	1,300	648.2	2,500	1,488.8	175,000	876.7	-	3,013.7
%		21.5		49.4		29.1		100.0
1980 I	2,800	1,536.4	1,050	630.1	230,000	1,014.8	-	3,181.3
II								
(present)	200	116.4	150	95.3	-	-	-	211.7
Sub-total	3,000	1,652.8	1,200	725.4	230,000	1,014.8	-	3,393.0
%		48.7		21.4		29.9		100.0
TOTAL	<u>5,950</u>	<u>3,036.0</u>	<u>4,525</u>	<u>2,583.8</u>	<u>505,000</u>	<u>2,283.6</u>	<u>750</u>	<u>8,653.4</u>
%		35.1		29.8		26.4	8.7	100.0

Treasurer's Department  
January 1980



REVALUATION BREAK-EVEN POINT CALCULATIONS

The attached tables list all Swiss francs, German mark and yen market borrowings done between FY78 and mid-FY80 together with their financial costs and average lives.

They also show the hypothetical dollar borrowing cost and the dollar depreciation required in each case to equalize the currency and dollar cost figure (break-even point).

The calculations use total nominal cost figures for each individual borrowing and hypothetical dollar borrowing costs as described in paragraph 9 (c) (rates for U.S. Treasury obligations plus 50 basis points plus underwriting costs).

Treasurer's Department  
January 1980

BREAK-EVEN POINT CALCULATIONSSwiss franc borrowings compared to  
hypothetical dollar borrowings

<u>Fiscal year</u>	<u>Sw F borrowings (in millions)</u>	<u>Sw F cost (in %)</u>	<u>Hypothetical \$ cost (in %)</u>	<u>Average life (yrs.)</u>	<u>Original Break-even point (in %)</u>	<u>To date \$ depreciation (appreciation) in Sw F terms*</u>
1978/I	200	5.65	7.71	7	14.5	34.3
	100	4.94	8.12	6	19.6	30.8
	150	4.96	8.29	12.5	47.8	30.9
	75	4.96	8.12	6	19.5	30.8
	II 300	4.81	8.20	6	21.0	19.5
1979/I	300	4.40	9.18	7	36.8	14.4
	100	4.30	9.07	5.	25.1	13.7
	150	4.35	9.11	7	36.6	9.8
	100	4.21	9.09	6	31.6	9.8
	100	4.02	9.09	6	33.0	9.8
	250	4.50	9.00	12.5	69.4	7.3
	100	4.11	9.03	8	44.7	7.2
	250	4.33	9.15	10	57.1	1.8
	100	4.07	9.03	8	45.1	.6
	125	4.07	9.13	6	33.0	.5
	200	4.02	9.03	8	45.7	(8.6)
	200	3.34	9.63	6	42.5	(6.6)
	125	3.89	9.59	8	53.3	(1.4)
	300	3.78	9.61	7	46.6	(1.4)
	II 100	5.00	9.85	10	57.1	6.1
1980/I	100	5.01	9.96	10	58.5	6.1
	100	4.51	9.65	7	39.9	7.0
	200	4.66	9.55	6	31.5	1.8
	150	4.66	9.85	10	62.3	2.6
	200	4.70	9.55	6	31.2	2.4
	200	4.01	9.97	4	25.0	2.4
	100	5.00	10.79	12	90.4	.7
	II 150	5.78	11.21	6	35.0	(2.7)

\*From date of each borrowing as of 1/28/80  
(Exchange rate US\$1 = Sw F 1.617)

BREAK-EVEN POINT CALCULATIONSDeutsche mark borrowings compared to  
hypothetical dollar borrowings

<u>Fiscal year</u>	<u>DM borrowings (in millions)</u>	<u>DM cost (in %)</u>	<u>Hypothetical \$ cost (in %)</u>	<u>Average life (yrs.)</u>	<u>Original Break-even point (in %)</u>	<u>To date \$ depreciation (appreciation) in DM terms*</u>	
1978/I	200	6.86	8.20	15	20.6	24.0	
	300	6.24	7.86	8	12.9	25.3	
	150	5.72	7.53	5	8.9	25.3	
	100	6.43	8.24	10	18.4	24.4	
	200	6.87	8.30	13	18.9	23.1	
	200	6.20	8.15	8	15.7	23.1	
	II	500	6.06	8.54	10.5	27.5	18.9
1979/I	200	6.18	9.15	6	18.0	15.8	
	200	6.46	9.18	10	28.7	15.8	
	500	6.25	9.05	5	13.9	15.9	
	400	6.50	9.44	10	31.3	7.8	
1980/I	300	7.38	9.65	7	15.8	9.3	
	400	7.81	9.42	12	19.5	7.3	
	200	7.35	9.35	8	15.9	3.9	
	400	7.32	9.55	6	13.1	4.8	
	150	7.97	9.77	15	28.1	5.2	
	50	7.73	9.86	10	21.6	5.2	
	100	7.97	9.68	20	36.9	5.2	
	150	7.97	9.81	13	24.6	5.2	
	150	7.00	9.97	5	14.7	4.0	
	100	6.89	9.97	5	15.3	4.1	
	250	7.88	11.00	15	53.4	3.8	
	200	8.01	11.00	15	50.6	3.8	
	250	8.03	11.12	10	32.6	(1.0)	
	100	7.99	11.12	10	33.1	(.9)	
	II	100	8.22	11.04	12.5	38.0	(1.1)
		100	8.22	11.04	12.5	38.0	(1.1)

\*From date of each borrowing as of 1/28/80  
(Exchange rate US\$1 = DM 1.737)

Treasurer's Department  
January 1980

BREAK-EVEN POINT CALCULATIONS

Yen borrowings compared to  
hypothetical dollar borrowings

<u>Fiscal year</u>	<u>¥ borrowings (in millions)</u>	<u>¥ cost (in %)</u>	<u>Hypothetical \$ cost (in %)</u>	<u>Average life (yrs.)</u>	<u>Original Break-even point (in %)</u>	<u>To date \$ depreciation (appreciation) in ¥ terms*</u>
1978/I	20,000	6.53	7.87	7	9.1	9.4
	30,000	7.30	8.29	12.3	12.0	9.4
	50,000	7.07	8.21	12.3	13.9	2.4
1979/I	75,000	6.76	9.17	12.3	31.6	(17.6)
	30,000	7.68	9.17	17.5	27.2	(18.8)
	70,000	7.65	9.17	17.5	24.2	(24.3)
1980/I	30,000	8.03	9.67	17.5	30.2	(9.6)
	12,000	8.13	9.67	17.5	28.1	(9.6)
	15,000	8.06	9.67	17.5	29.5	(9.6)
	18,000	8.16	9.53	17.5	24.6	(9.6)
	40,000	8.12	9.53	17.5	25.5	(9.6)
	55,000	8.34	11.00	17.5	52.9	(2.1)
	30,000	8.34	11.00	17.8	54.2	(2.1)
	30,000	8.52	11.39	12.3	37.8	(2.6)

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\*From date of each borrowing as of 1/28/80  
(Exchange rate US\$1 = ¥240)

Treasurer's Department  
January 1980

EXCHANGE RATE FLUCTUATIONS OF SWISS FRANCS, GERMAN MARKS  
AND JAPANESE YEN VIS-A-VIS THE U.S. DOLLAR DURING THE  
PERIOD 7/1978 TO 1/28/1980

The rates shown for the half-yearly periods from FY78/I to the present are averages reflecting the weight of specific borrowing operations during these periods. In cases where no borrowings occurred during a period the statistical averages of the IMF's International Financial Statistics are used.

<u>Fiscal Year</u>	<u>Swiss franc</u>		<u>German mark</u>		<u>Japanese yen</u>	
	<u>Sw F/\$1</u>	<u>Index</u>	<u>DM/\$1</u>	<u>Index</u>	<u>¥/ \$1</u>	<u>Index</u>
1978 I	2.383	100.0	2.265	100.0	255	100.0
II	2.009	84.3	2.076	91.7	220	86.3
1979 I	1.678	70.4	1.961	86.6	200	78.4
II	1.721	72.2	1.874	82.7	206	80.8
1980 I	1.666	69.9	1.820	80.4	226	88.6
II						
(to present)	1.574	66.1	1.718	75.8	234	91.8
1/28/80	1.617	67.9	1.737	76.7	240	94.1

Treasurer's Department  
January 1980

BORROWING COST SENSITIVITY ANALYSIS

In order to analyze the sensitivity of the dollar-based cost (real cost) of the Bank's Swiss franc, German mark and Japanese yen borrowings over the period FY78/I through FY80/II to possible exchange rate changes over the remaining life of the borrowings, a computer test was devised based on the following assumptions and procedures.

Historical exchange rates were used to convert the currency cash flow stream resulting from a currency borrowing to a dollar stream for the period through FY80/II. The exchange rates prevailing on January 28, 1980 were used for FY80/II.

For the period FY81/I through FY99/I constant (linear) changes in the currency/\$ exchange rates were assumed to reach given final levels in 1999. The forecast dollar equivalent cash flow was obtained using these streams of exchange rates. The final levels in the exchange rates of 1999 were then varied over a range to determine the sensitivity of the dollar-based costs of the borrowings in each of the three currencies.

The results of these sensitivity tests are presented in paragraph 11 of the text and on three attached graphs, (pages 3, 4 and 5) where the dollar-based cost of borrowing is plotted versus the final exchange rate level for 1999 for each of the three currencies.

In order to compare the dollar-based costs for each currency a cash flow stream of hypothetical dollar borrowings was set up such that the maturity, timing and amount of the hypothetical borrowings correspond to the actual Swiss franc, German mark and Japanese yen borrowings converted at the historical exchange rates to dollars.

The dollar-based costs of Swiss franc, German mark and Japanese yen borrowings under varying exchange rate assumptions are then directly comparable to the respective hypothetical dollar borrowing costs for each currency. Note that the hypothetical dollar borrowing costs are independent of future exchange rate variations.

Three points of particular interest are indicated on the attached sensitivity plots:

Point A - corresponds to the assumption of constant exchange rates from FY80/II through FY99/I.

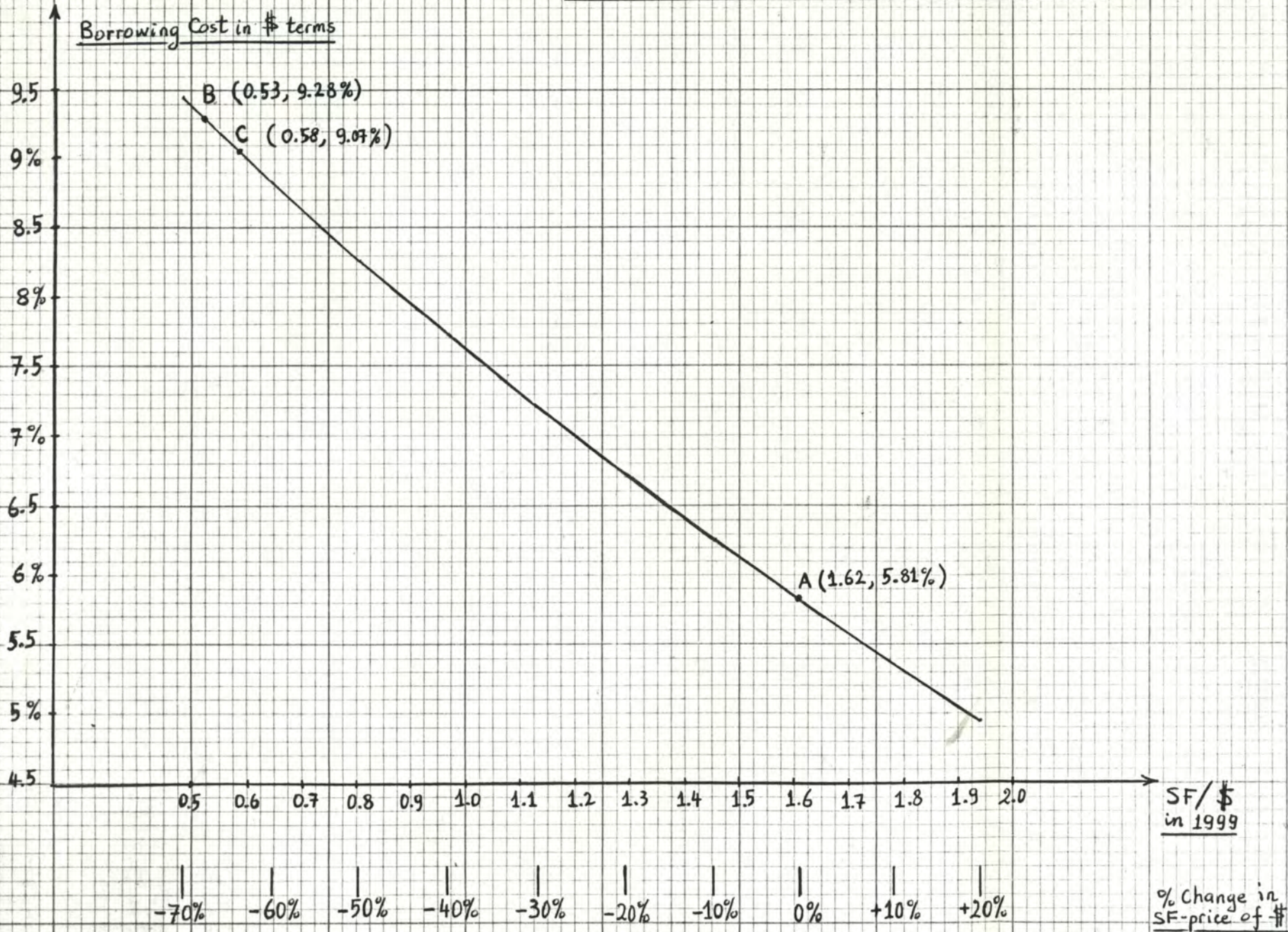
Point B - corresponds to the point at which the hypothetical dollar borrowing and the actual borrowing in the hard currency would have equal cost.

Point C - corresponds to a point attempting to capture roughly the exchange rate levels of 1999 predicted solely by the interest rate differentials on long-term government bonds in the different currencies. The long-term semi-annual yields assumed on the various currencies were those of January 28, 1980: 11% on dollars, 5.40% on Swiss francs, 8.25% on German mark and 8.50% on Japanese yen. These differentials in interest rates imply the following exchange rates in 1999: 0.58 Sw F/\$, 1.06 DM/\$ and 153 ¥/\$. It should be noted that such interest rate differentials in medium and long-term markets have not, to date, been accurate predictors of exchange rates in either the short or longer run.

Finally, a sensitivity analysis was also carried out on the aggregate borrowings by assuming that the dollar would depreciate linearly against all three of the currencies at the same rate, to reach a range of levels in 1999. The assumption is that the hard currencies all stay in line with each other throughout the life of the cash flows while the dollar depreciates steadily against each one. The results are presented in the attached plot (page 6). Point A (assuming no further depreciation of the dollar) gives a dollar cost of 7.35% for the total borrowing program. Point B (where the hypothetical all-dollar borrowing cost of 9.42% and the actual hard currency borrowing program cost are equal) indicates that the dollar can still depreciate by almost 40% of its current value against each of the three currencies before the currency borrowing program exceeds the hypothetical all-dollar borrowing program in cost.

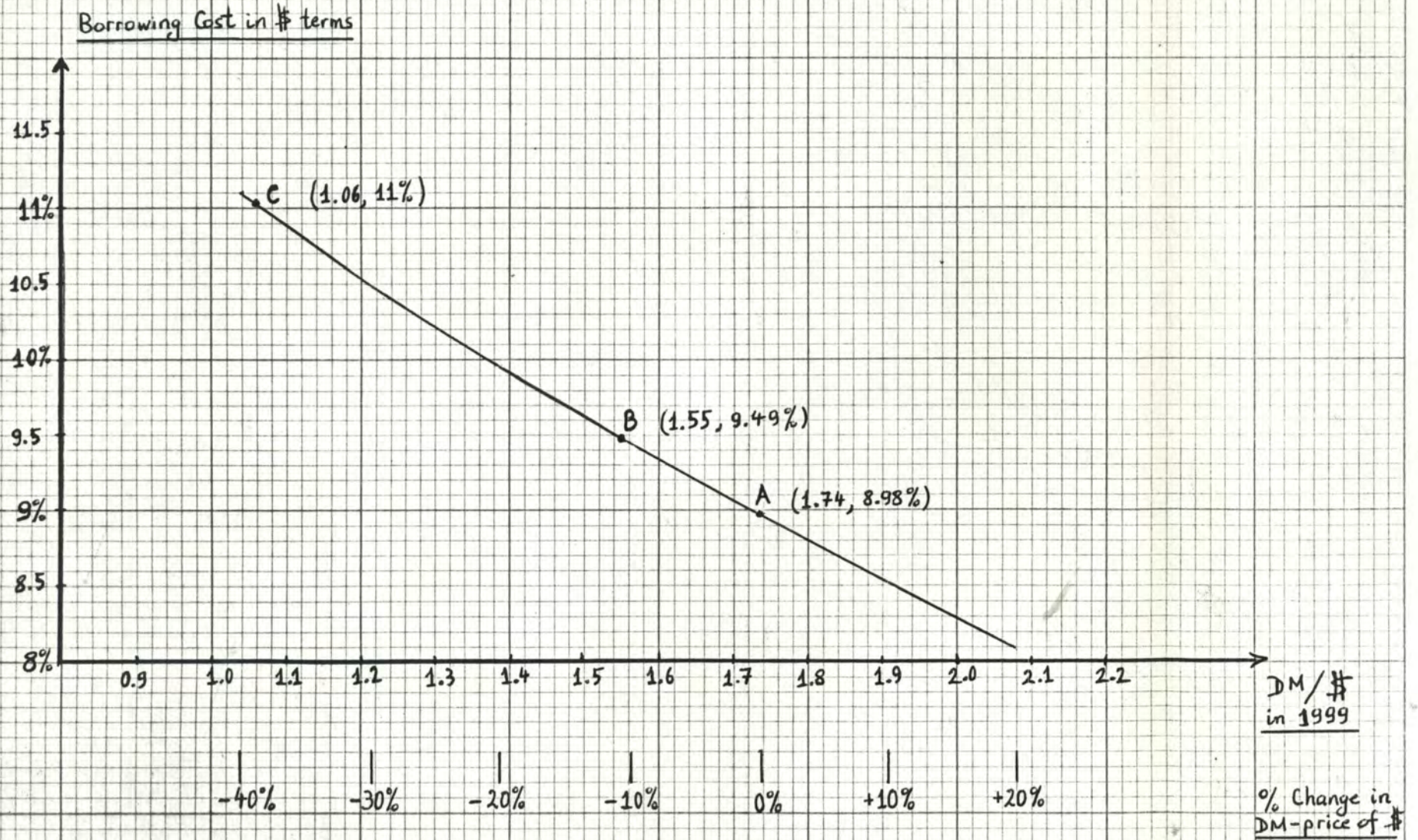
We also evaluated Point C (assuming the dollar depreciates linearly to the market-implied forward rates of 1999) for the aggregate borrowings. Point C indicates a dollar-based cost of 9.71% for the currency borrowing program compared to a cost of 9.42% for the hypothetical all-dollar borrowing program, a net additional cost of 0.29%.

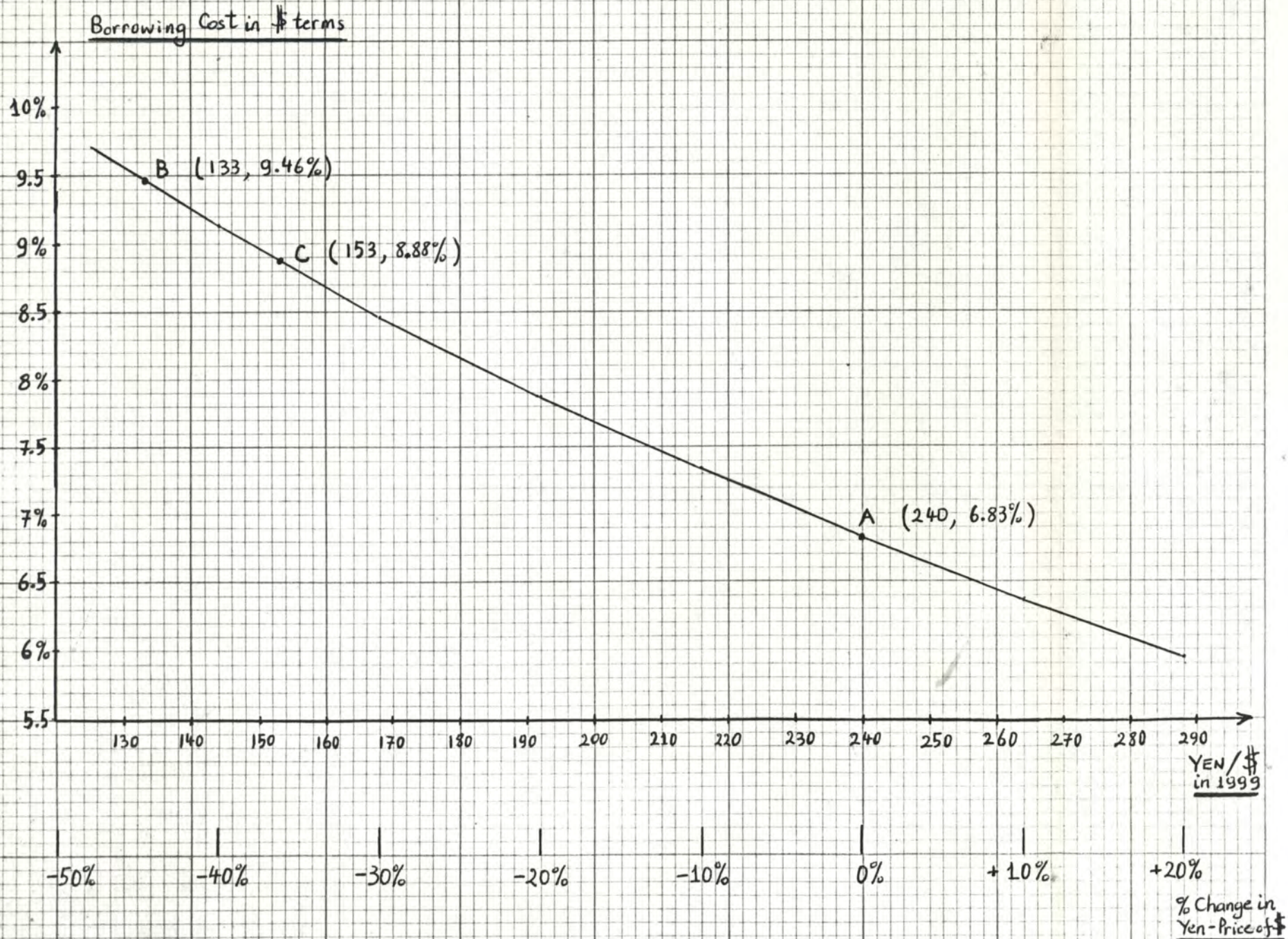
SENSITIVITY ANALYSIS FOR S.F. BORROWINGS



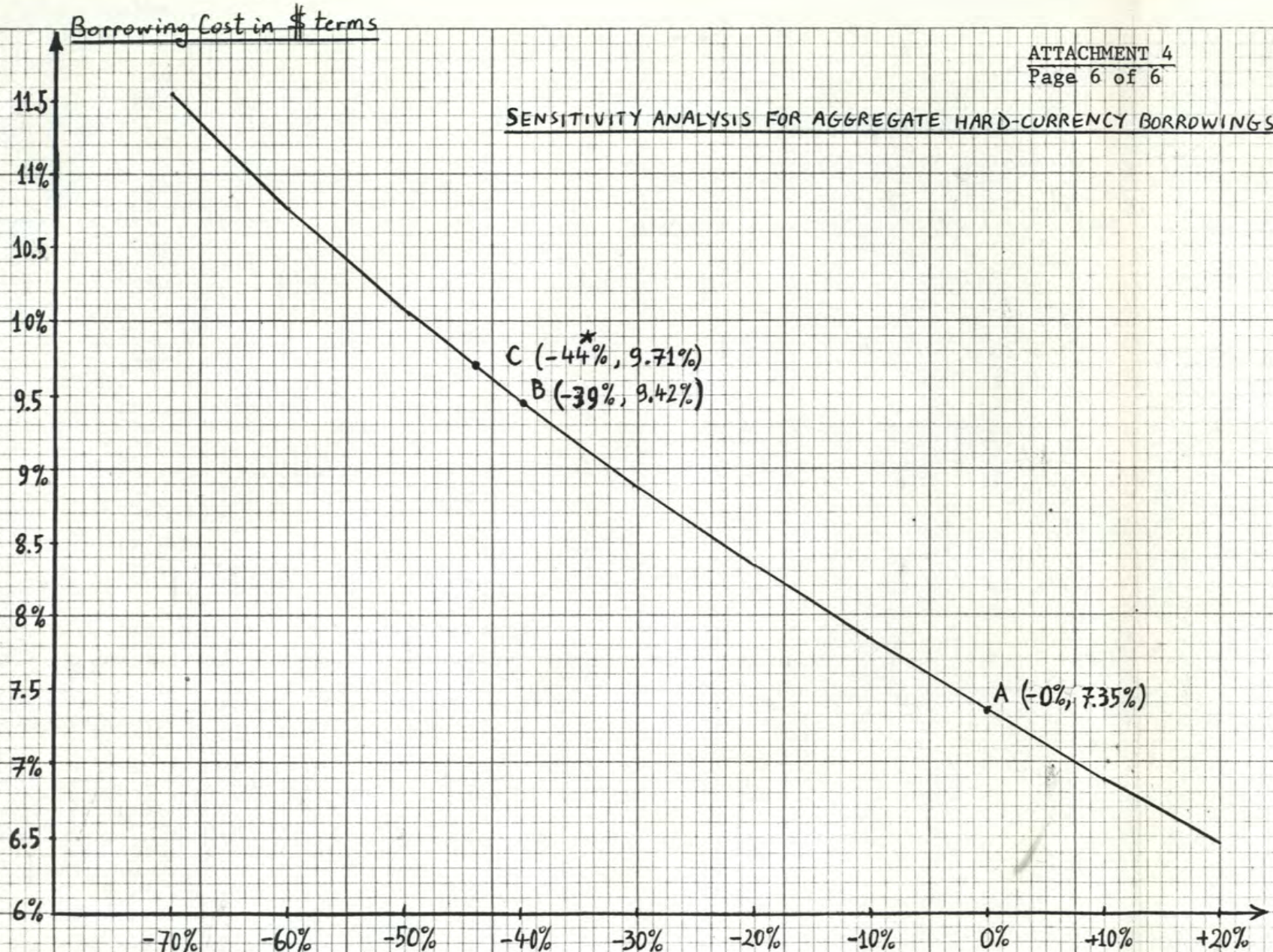


SENSITIVITY ANALYSIS FOR D.M. BORROWINGS



SENSITIVITY ANALYSIS FOR YEN BORROWINGS

SENSITIVITY ANALYSIS FOR AGGREGATE HARD-CURRENCY BORROWINGS



\* Total average linear depreciation of the dollar required if we assume the market-implied exchange rates for 1999.

% Change in Hard-Currency Prices of \$

	-70%	-60%	-50%	-40%	-30%	-20%	-10%	0%	+10%	+20%	Rates in 1999
	0.48	0.65	0.81	0.97	1.13	1.29	1.46	1.62	1.78	1.94	SF/\$
	0.52	0.70	0.87	1.04	1.22	1.39	1.56	1.74	1.91	2.08	DM/\$
	72	96	120	144	168	192	216	240	264	288	YEN/\$

## OFFICE MEMORANDUM

TO: Mr. Robert S. McNamara

FROM: Eugene H. Rotberg

SUBJECT: Cost of IBRD Borrowings

DATE February 5, 1980

In the attached paper we analyze the "real" cost of the Bank's total borrowings of Swiss francs, Deutsche mark and Yen since FY78 and compare such costs to a range of potential future exchange rate developments over the life of these "hard currency" borrowings. We assume, in particular, that the dollar will depreciate in varying degrees against each of such currencies through 1999 - the year by which all of the hard currency borrowings will have matured. We also determined what the cost of a hypothetical dollar borrowing program would have been had we substituted a corresponding dollar borrowing for each of the non-dollar currency borrowings in this period. The sensitivity tests are summarized in the text of the memorandum and on four graphs where the dollar-based (real) cost of the borrowing program since FY78 is plotted versus the final exchange rate for each of the three non-dollar currencies, and for the aggregate stream of such currencies. Three points of interest are also indicated on each plot: the case in which future exchange rates remain constant (Point A); the case reflecting the final exchange rate level for which the hard currency borrowing cost breaks even with the cost of the corresponding hypothetical dollar borrowings (Point B); and the case reflecting the borrowing cost if exchange rates were to reach the level currently implied by the long-term capital yield differentials between the dollar and each of the hard currencies (Point C).

The paper discusses the "real cost" of borrowings to the Bank implying that the analytical results also reflect the impact of such cost on our borrowers, i.e. to the system. The paper technically does not discuss the "real costs" actually assumed by our borrowers, i.e. our disbursement policy. That matter will be discussed at meetings that Moeen and I have scheduled with the Executive Directors. For the most part, we have relatively little flexibility with respect to our disbursements (even assuming we had a view amongst alternative currencies which were likely to appreciate or depreciate over the next 6 months to 15 years) since virtually most, if not all, of the capital-exporting countries have imposed quite stringent requirements on our disbursement versus investment policies as a condition to our borrowing. Our flexibility to choose what currency to disburse is also limited by the Bank's debt servicing obligations which have a considerable effect on whether we hold a particular currency in order to fulfill such obligations or disburse it. Finally, and most important, a paper on disbursement policies would have to encompass the whole range of issues concerning "income targets" since, even to the extent that we have flexibility, a balance must be struck between what is in the interest of our borrowers--assuming we knew what that was--and the quite certain effect on our reported income and reserves of a policy which ignored such matters. And any "advantage" to our borrowers, to the extent it adversely affected the Bank, would have to be made up somehow--probably by an increase in the lending rate. It is far better that, if "excess" income develops for whatever reason, the Bank allocate that "excess" for the best interest of our borrowers after it is earned.

17 To Mr. Rotberg  
1. Please add this  
to my report  
on the Finance  
Committee agenda  
4. Note the changes  
I had suggested  
in the draft.  
Loren

Mr. Robert S. McNamara

- 2 -

February 5, 1980

Nonetheless, the fact is that, despite all of this, our disbursements have not been out of line with our borrowings. See the Table (on the page following) which is not incorporated into the text.

I have circulated the draft paper to Moeen, PAB and Jack Polak for their comments. The data and analyses were developed by Hans Hittmair and Adnan Akant of our Investment Division.

Attachments

EHRotberg:emk

## Disbursements and Borrowings \*)

(In Millions of US\$ Equivalent)

	Japanese Yen		Deutsche Mark		US-Dollars		Swiss Francs	
	Amount Disbursed	Amount Borrowed	Amount Disbursed	Amount Borrowed	Amount Disbursed	Amount Borrowed	Amount Disbursed	Amount Borrowed
FY 1978								
1st half	393.2	392.1	439.0	501.6	156.2	750.0	257.0	220.3
2nd half	351.4	-	439.3	233.4	201.3	-	235.2	149.3
FY 1979								
1st half	222.1	876.7	113.4	648.2	95.3	-	1,142.6	1,430.7
2nd half	954.1	-	214.5	-	151.2	-	552.0	58.1
FY 1980								
1st half	343.3	1,014.8	1,015.5	1,536.4	195.8	-	483.6	630.1
Total:	2,264.1	2,283.6	2,221.7	2,919.6	799.8	750.0	2,670.4	2,488.5

\*) Excluding Central Bank Rollovers

2/11/80

DRAFT

HCHittmair/AAkant/EHRotberg:mb

February 4, 1980

COST OF IBRD BORROWINGS

1. This memorandum is addressed to the "<sup>dollar</sup>real cost" of the Bank's borrowings of hard currencies (Swiss franc, German mark and Japanese yen) and whether a policy of greater ~~currency diversification including, in particular,~~ borrowings in U.S. dollars would have been more advantageous to the Bank and its borrowers. ~~In the Board Meeting of January 15, 1980 a request was made for an analysis of the "real cost" of our borrowings which included~~ <sup>ing</sup> ~~the effects of exchange rate fluctuations.~~ The following paper analyzes the total cost of Bank borrowings for the period from mid-1977 through January 1980 *including the effects of exchange rate fluctuations.*

2. The review concentrates on the Bank's market operations in Swiss franc, German mark, Japanese yen and U.S. dollars between July 1, 1977 and January 28, 1980. The borrowing operations analyzed total \$8.7 billion equivalent, <sup>the</sup> ~~or 71% of~~ total borrowings during this period after excluding (a) central bank re-financing operations in U.S. dollars, German mark and Japanese yen, (b) borrowings from the Third Window, and (c) borrowings denominated in currencies other than the four noted above. Attachment 1 shows the currency breakdown of this amount by half-yearly periods and fiscal years. The total summarizes 70 individual borrowing operations: 28 in Swiss franc, 27 in German mark, 14 in Japanese yen and one in U.S. dollars.

[is my rewording correct?]

3. The dollar borrowing included in the attachment occurred in July 1977 at the very beginning of the period analyzed. In the 2-1/2 years since then the Bank has not borrowed in the U.S. market (or in U.S. dollars from other sources) primarily because the nominal cost advantages resulting

from borrowing in the three hard currencies rather than in U.S. dollars appeared to offset the potential costs of the foreign exchange risk involved.

4. The assessment of the foreign exchange rate risk exposure for each individual borrowing operation is a matter of judgment. However, in order to provide some basis for quantification of that risk a break-even point calculation has been used since early 1977 for <sup>such</sup> the Bank's borrowing operations which compares the cost of hard currency borrowings with hypothetical dollar borrowings of equal maturity, and which calculates by how much the dollar would have to depreciate in value over the life of the borrowing in order to offset the nominal cost of the hypothetical dollar alternative. As long as the actual depreciation of the dollar remains less than the break-even point during the life of the loan the non-dollar borrowing is justified in dollar cost terms. Conversely if the actual dollar depreciation exceeds the break-even point this indicates that borrowing dollars would have been preferable - assuming such dollar borrowings were available.

5. Attachment 2 shows individual break-even point calculations for each Swiss franc, German mark and Japanese yen borrowing during the period under review which is included in this analysis. The data indicate relatively narrow break-even point margins at the time of the borrowings at the beginning of the period under study and much larger break-even margins later in the period when most of the Swiss franc, German mark and Japanese yen borrowings were executed.

6. Care has to be taken in interpreting these results. A judgment whether the Bank was "right" or "wrong" with respect to a particular borrowing cannot yet be determined with certainty. Further and more



important are the constraints which apply to our borrowing operations. For example, it would appear that the Bank's decision to borrow German mark in the first half of FY78 has proven to be costly because the dollar depreciation since then has exceeded the original break-even point calculation. It would therefore seem that the Bank should have, alternatively, borrowed dollars. In fact this was not possible. The Bank had just borrowed in April/May 1977 \$600 million in the U.S. market and repeated a U.S. dollar operation in July/August 1977 for an additional \$750 million. It would not have been possible for market technical reasons to borrow additional funds in the U.S. market. As a result the alternative of borrowing dollars was then no longer available and other currencies had to be considered in order to fulfil the requirements of the borrowing program.<sup>1/</sup>

7. The comparison between the dollar depreciation up to a certain date and the break-even point offers the opportunity for an assessment of the "<sup>Actual</sup>real cost" as of the date of the review - with hindsight.

However, in order to ~~assess the alternative cost of borrowing dollars, clearly an option available to the Bank in the last 2-1/2 years, and, further,~~ to assess the range of potential costs for the future, the following analyses <sup>have</sup> were undertaken:

---

<sup>1/</sup> It is also worth noting that in the preceding three years FY75 to FY77, the Bank borrowed \$5.5 billion in the U.S. market and from OPEC sources, equivalent to about 65% of total market borrowings (\$8.5 billion). During much of this period interest rates in the U.S. market and in the Swiss and German market were much closer than now. The Japanese market was closed altogether to foreign issuers during this period. In this situation the Bank therefore borrowed the maximum amount possible in U.S. dollars and supplemented these borrowings to the extent necessary to complete its program by borrowing Swiss francs and German mark.

*non-dollar*

(a) Currency cash flow - For ~~each of~~ the 69 borrowing operations, ~~a cash flow was prepared taking as borrowing receipts the face value of the borrowed amounts while for the debt service (cash outflow) the total cost of each transaction was annualized over the life of the borrowing. The cash flows were then aggregated by currency and the internal rate of return of the resulting net cash streams calculated. The internal rate of return is equivalent to~~ the consolidated cost of borrowings by currency, giving appropriate weight to the amount, timing and maturity structure of each borrowing operation, *now calculated.*

(b) Dollar equivalent cash flow - The net currency cash flows were then converted into U.S. dollars at historic exchange rates. Attachment 3 shows the average exchange rates used for these conversions, with the rates as of 1/28/80 assumed to apply for the second half of 1980; an index figure shows how the interest rates have varied from the level in FY78/I which is given as 100. For future exchange rates a sensitivity analysis was done assuming exchange rate movements from a 20% dollar appreciation to a 70% dollar depreciation to produce a series of dollar equivalent cash streams for which *dollar cost rates were* ~~the internal rates of return were also~~ calculated. *These rates* ~~of return~~ when compared to *the rates on terms* ~~those of the currency~~ *international* cash flows *measure* the additional cost due ~~solely~~ to foreign exchange rate fluctuations.

(c) Hypothetical dollar equivalent cash flows - In order to show the hypothetical cost burden for the Bank if it had borrowed dollars instead of the above currencies, ~~a further series of cash flows was prepared substituting for each borrowing in Swiss franc, German mark and Japanese yen an equivalent dollar borrowing with an identical maturity and a dollar market related interest rate~~ *was substituted.* ~~at the time of each such borrowing.~~ The

<sup>interest</sup>  
 dollar market rate was established by adding a 50 basis point average spread (plus the appropriate underwriting cost) to the cost of a U.S. Treasury obligation of comparable maturity - a spread considerably below the recent yields of Bank obligations.

9. The following table summarizes the <sup>interest costs in national currencies for the alternative borrowing programs</sup> ~~computations for the cash flows described in points (a) and (c) of the previous paragraphs~~ for the ~~2-1/2 year borrowing period~~:

*Table 1*  
~~Internal rate of return calculations for currency and hypothetical dollar equivalent cash flows from FY78 onward~~  
*Interest cost of Borrowings Entered into Between 7/1/77 and 7/1/80*

Currency	<sup>Interest Cost of</sup> <del>Currency Cash Flow</del> <i>(nominal cost)</i>	<sup>Cost of</sup> <del>Hypothetical U.S. dollar borrowings</del>	Basis point spread
Sw F	4.50%	9.28%	478
DM	7.16%	9.49%	233
¥	7.69%	9.46%	177
Weighted average <sup>2/</sup>	6.44	9.41	297

*Compared to the cost of comparable Dollar Borrowings*

<sup>Borrowing Operations</sup>  
 1/ For a description of the ~~cash flows and other assumptions~~ used in these calculations see paragraph 7 (a) and (c)  
 2/ Average cost weighted by amount of borrowings expressed in dollar equivalents

The figures in this table show that the nominal ~~financial~~ cost of borrowing U.S. dollars instead of Swiss franc, German mark and Japanese yen during the past 2-1/2 years would have been 297 basis points or 46% higher, corresponding to an actual additional cost of about \$235 million per year for the life of the debt under review. These computations <sup>are, however, before taking account of the effect of</sup> are not subject to foreign exchange rate fluctuations.

10. In order to establish the "real cost" of the Bank's borrowings, including foreign exchange movements, a sensitivity analysis described in paragraph 7(b) was done and its results are shown in Attachment 4.

The calculations can be summarized as follows:

*Table 2*  
*Dollar cost of dollar borrowings assuming varying rates of depreciation of the dollar against foreign currencies*

~~Internal rate of return calculations for \$ equivalent cash flows from FY78 onward (sensitivity analysis of real cost) 1/~~

Currency	<i>2</i> \$ depreciation against currency (in %)							
	0	10	20	30	40	50	60	70
1. Sw F <i>Dollar Borrowing</i>								
Real cost (%)	5.81	6.26	6.73	7.22	7.73	8.26	8.83	9.42
Sw F/\$ rate (Sw F)	1.62	1.46	1.29	1.13	0.97	0.81	0.65	0.48
2. DM <i>Dollar Borrowing</i>								
Real cost (%)	8.98	9.46	9.96	10.49	11.05	11.65	12.29	12.99
DM/\$ rate (DM)	1.74	1.56	1.39	1.22	1.04	0.87	0.69	0.52
3. ¥ <i>Dollar Borrowing</i>								
Real cost (%)	6.83	7.34	7.88	8.47	9.12	9.84	10.66	11.61
¥/\$ rate (¥)	240	216	192	168	144	120	96	72
4. Aggregate real cost (%)	7.35	7.83	8.34	8.88	9.46	10.09	10.78	11.55

1/ ~~For cash flow description and other assumptions used see paragraph 7(b) and Attachment 4~~

The above table assumes different linear depreciation rates of the dollar (0 to 70%) from now through FY99 which is the last year of the underlying cash flows.

It shows the real cost related to these depreciation rates e.g. a 30% depreciation of the dollar against the Swiss franc from Sw F 1.62/\$ now to Sw F 1.13/\$ by FY99 would increase the "real cost" of the Swiss franc borrowings from 5.81% to 7.22%. It should be noted that foreign exchange rate movements usually do not occur in linear form but rather in quantum jumps. However it was not found possible to propose any generally acceptable assumptions concerning the frequency or amount of such movements and the

linear increases in rates was therefore used for the purposes of the sensitivity analysis.

11. The graphs in Attachment 4 illustrate specific ranges of the above dollar depreciation assumptions covering three specific points:

Point A - assumes constant exchange rates for the future, i.e. the rates prevailing as of January 28, 1980.

Point B - represents a break-even point calculation determining the dollar depreciation rate which would be necessary from January 28, 1980 to equalize real costs and hypothetical dollar costs over the life of the remaining cash flow for each currency.

Point C - shows the level of exchange rates implied in long term capital interest rate differentials. This market-implied forecast of foreign exchange rates has not offered a reliable forecast on foreign exchange rates based on past experience.

The following table summarizes the results:

Table 3

Internal rate of return calculations for specific \$ depreciation rates included in Table 2

<u>Currency</u>	<u>Point A</u>	<u>Point B</u>	<u>Point C</u>
1. <u>Sw F</u>			
Real cost (%)	5.81	9.28	9.07
Sw F/\$ rate (Sw F)	1.62	.53	.58
Range of \$ depreciation assumed (%)	0	60-70	60-70
2. <u>DM</u>			
Real cost (%)	8.98	9.49	11.0
DM/\$ rate (DM)	1.74	1.55	1.06
Range of \$ depreciation assumed (%)	0	10-20	30-40
3. <u>¥</u>			
Real cost (%)	6.83	9.46	8.88
¥/\$ rate (¥)	240	133	153
Range of \$ depreciation assumed (%)	0	40-50	30-40
4. <u>Aggregate real cost (%)</u>	7.35	9.42	9.71

12. The margins of further dollar depreciation from current rates which would equalize the total cost burden of borrowing Swiss franc, German mark and Japanese yen versus hypothetical U.S. dollars from now on through the remaining life of the borrowings analyzed, differ between the three currencies as follows:

Dollar depreciation in currency terms required to  
equalize real cost and hypothetical dollar cost

<u>Currency</u>	
Sw F	67.3%
DM	10.9%
¥	44.5%
Aggregate	39.3%

While the margins for Swiss francs and Japanese yen appear substantial the German mark margins appear tight. For the most part, this is due to the fact that the early German mark borrowings in FY78 were always marginal from the point of view of their total cost including the foreign exchange risk exposure, given their rather low revaluation break-even point at the time. The decision to proceed with them was based on considerations concerning availability constraints described earlier. Further, it is appropriate to note that the future dollar depreciation required to equalize the real cost and hypothetical dollar cost viz., 67.3%, 10.9%, and 44.5% for Swiss franc, German mark and Japanese yen respectively have no relevance to determining whether a new borrowing in one of these currencies at any particular break-even point is or is not appropriate.

13. In summary, the Bank's borrowings of Swiss franc, German mark and Japanese yen during the period FY78 through mid-FY80 has not produced to date a real cost burden as compared to the cost of borrowing U.S. dollars instead. Indeed a further substantial depreciation of the dollar would be required to equalize such costs. However, such a depreciation while

it may yet occur is not being predicted as it would have to be accompanied by major economic changes which are not susceptible to normal forecasting. Thus in those cases where the Bank had a reasonable choice to borrow dollars or Swiss franc, German mark or Japanese yen and this applied to most of the period under review, the decisions to borrow hard currencies at lower nominal costs still appear justified under any set of reasonable assumptions on future foreign exchange rate developments between these currencies and the dollar. Currency diversification would not have achieved better results and the substantial borrowings of U.S. dollars even assuming that they could have been absorbed in the market would have led to substantial additional cost burdens. Such borrowings would only be justified for reasons other than cost. Indeed, despite rather wide break-even point margins and a very high nominal cost in U.S. dollars which would continue to support non-dollar borrowings, we expect to bring to the Board of Executive Directors substantial U.S. dollar borrowings in the future because of the size of the overall program and the need to avoid saturating any one particular market.

ATTACHMENT 1

IBRD BORROWINGS: FY78-FY80 (1/28/79)  
(excluding central bank rollovers)

Fiscal years	DM		Sw F		¥		\$	Total
	DM	\$ equiv.	Sw F	\$ equiv.	¥	\$ equiv.		\$ equiv.
	-----in millions of currency units-----							
1978 I	1,150	501.6	525	220.3	100,000	392.1	750	1,864.0
II	500	233.4	300	149.3	-	-	-	382.7
Sub-total	<u>1,650</u>	<u>735.0</u>	<u>825</u>	<u>369.6</u>	<u>100,000</u>	<u>392.1</u>	<u>750</u>	<u>2,246.7</u>
%		32.7		16.4		17.5	33.4	100.0
1979 I	1,300	648.2	2,400	1,430.7	175,000	876.7		2,955.6
II	-	-	100	58.1	-	-		58.1
Sub-total	<u>1,300</u>	<u>648.2</u>	<u>2,500</u>	<u>1,488.8</u>	<u>175,000</u>	<u>876.7</u>	-	<u>3,013.7</u>
%		21.5		49.4		29.1		100.0
1980 I	2,800	1,536.4	1,050	630.1	230,000	1,014.8	-	3,181.3
II								
(present)	200	116.4	150	95.3	-	-	-	211.7
Sub-total	<u>3,000</u>	<u>1,652.8</u>	<u>1,200</u>	<u>725.4</u>	<u>230,000</u>	<u>1,014.8</u>	-	<u>3,393.0</u>
%		48.7		21.4		29.9		100.0
<b>TOTAL</b>	<u><u>5,950</u></u>	<u><u>3,036.0</u></u>	<u><u>4,525</u></u>	<u><u>2,583.8</u></u>	<u><u>505,000</u></u>	<u><u>2,283.6</u></u>	<u><u>750</u></u>	<u><u>8,653.4</u></u>
%		35.1		29.8		26.4	8.7	100.0

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REVALUATION BREAK-EVEN POINT CALCULATIONS

The attached tables list all Swiss francs, German mark and yen market borrowings done between FY78 and mid-FY80 together with their financial costs and average lives.

They also show the hypothetical dollar borrowing cost and the dollar depreciation required in each case to equalize the currency and dollar cost figure (break-even point).

The calculations use total nominal cost figures for each individual borrowing and hypothetical dollar borrowing costs as described in paragraph 9 (c) (rates for U.S. Treasury obligations plus 50 basis points plus underwriting costs).

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BREAK-EVEN POINT CALCULATIONSSwiss franc borrowings compared to  
hypothetical dollar borrowings

<u>Fiscal year</u>	<u>Sw F borrowings (in millions)</u>	<u>Sw F cost (in %)</u>	<u>Hypothetical \$ cost (in %)</u>	<u>Average life (yrs.)</u>	<u>Original Break-even point (in %)</u>	<u>To date \$ depreciation (appreciation) in Sw F terms*</u>
1978/I	200	5.65	7.71	7	14.5	34.3
	100	4.94	8.12	6	19.6	30.8
	150	4.96	8.29	12.5	47.8	30.9
	75	4.96	8.12	6	19.5	30.8
II	300	4.81	8.20	6	21.0	19.5
1979/I	300	4.40	9.18	7	36.8	14.4
	100	4.30	9.07	5.	25.1	13.7
	150	4.35	9.11	7	36.6	9.8
	100	4.21	9.09	6	31.6	9.8
	100	4.02	9.09	6	33.0	9.8
	250	4.50	9.00	12.5	69.4	7.3
	100	4.11	9.03	8	44.7	7.2
	250	4.33	9.15	10	57.1	1.8
	100	4.07	9.03	8	45.1	.6
	125	4.07	9.13	6	33.0	.5
	200	4.02	9.03	8	45.7	(8.6)
	200	3.34	9.63	6	42.5	(6.6)
	125	3.89	9.59	8	53.3	(1.4)
	300	3.78	9.61	7	46.6	(1.4)
II	100	5.00	9.85	10	57.1	6.1
1980/I	100	5.01	9.96	10	58.5	6.1
	100	4.51	9.65	7	39.9	7.0
	200	4.66	9.55	6	31.5	1.8
	150	4.66	9.85	10	62.3	2.6
	200	4.70	9.55	6	31.2	2.4
	200	4.01	9.97	4	25.0	2.4
	100	5.00	10.79	12	90.4	.7
II	150	5.78	11.21	6	35.0	(2.7)

\*From date of each borrowing as of 1/28/80  
(Exchange rate US\$1 = Sw F 1.617)

BREAK-EVEN POINT CALCULATIONS

Deutsche mark borrowings compared to  
hypothetical dollar borrowings

<u>Fiscal year</u>	<u>DM borrowings (in millions)</u>	<u>DM cost (in %)</u>	<u>Hypothetical \$ cost (in %)</u>	<u>Average life (yrs.)</u>	<u>Original Break-even point (in %)</u>	<u>To date \$ depreciation (appreciation) in DM terms*</u>	
1978/I	200	6.86	8.20	15	20.6	24.0	
	300	6.24	7.86	8	12.9	25.3	
	150	5.72	7.53	5	8.9	25.3	
	100	6.43	8.24	10	18.4	24.4	
	200	6.87	8.30	13	18.9	23.1	
	200	6.20	8.15	8	15.7	23.1	
II	500	6.06	8.54	10.5	27.5	18.9	
1979/I	200	6.18	9.15	6	18.0	15.8	
	200	6.46	9.18	10	28.7	15.8	
	500	6.25	9.05	5	13.9	15.9	
	400	6.50	9.44	10	31.3	7.8	
1980/I	300	7.38	9.65	7	15.8	9.3	
	400	7.81	9.42	12	19.5	7.3	
	200	7.35	9.35	8	15.9	3.9	
	400	7.32	9.55	6	13.1	4.8	
	150	7.97	9.77	15	28.1	5.2	
	50	7.73	9.86	10	21.6	5.2	
	100	7.97	9.68	20	36.9	5.2	
	150	7.97	9.81	13	24.6	5.2	
	150	7.00	9.97	5	14.7	4.0	
	100	6.89	9.97	5	15.3	4.1	
	250	7.88	11.00	15	53.4	3.8	
	200	8.01	11.00	15	50.6	3.8	
	250	8.03	11.12	10	32.6	(1.0)	
	100	7.99	11.12	10	33.1	(.9)	
	II	100	8.22	11.04	12.5	38.0	(1.1)
		100	8.22	11.04	12.5	38.0	(1.1)

\*From date of each borrowing as of 1/28/80  
(Exchange rate US\$1 = DM 1.737)

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BREAK-EVEN POINT CALCULATIONS

Yen borrowings compared to  
hypothetical dollar borrowings

<u>Fiscal year</u>	<u>¥ borrowings (in millions)</u>	<u>¥ cost (in %)</u>	<u>Hypothetical \$ cost (in %)</u>	<u>Average life (yrs.)</u>	<u>Original Break-even point (in %)</u>	<u>To date \$ depreciation (appreciation) in ¥ terms*</u>
1978/I	20,000	6.53	7.87	7	9.1	9.4
	30,000	7.30	8.29	12.3	12.0	9.4
	50,000	7.07	8.21	12.3	13.9	2.4
1979/I	75,000	6.76	9.17	12.3	31.6	(17.6)
	30,000	7.68	9.17	17.5	27.2	(18.8)
	70,000	7.65	9.17	17.5	24.2	(24.3)
1980/I	30,000	8.03	9.67	17.5	30.2	(9.6)
	12,000	8.13	9.67	17.5	28.1	(9.6)
	15,000	8.06	9.67	17.5	29.5	(9.6)
	18,000	8.16	9.53	17.5	24.6	(9.6)
	40,000	8.12	9.53	17.5	25.5	(9.6)
	55,000	8.34	11.00	17.5	52.9	(2.1)
	30,000	8.34	11.00	17.8	54.2	(2.1)
	30,000	8.52	11.39	12.3	37.8	(2.6)

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\*From date of each borrowing as of 1/28/80  
(Exchange rate US\$1 = ¥240)

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EXCHANGE RATE FLUCTUATIONS OF SWISS FRANCS, GERMAN MARKS  
AND JAPANESE YEN VIS-A-VIS THE U.S. DOLLAR DURING THE  
PERIOD 7/1978 TO 1/28/1980

The rates shown for the half-yearly periods from FY78/I to the present are averages reflecting the weight of specific borrowing operations during these periods. In cases where no borrowings occurred during a period the statistical averages of the IMF's International Financial Statistics are used.

Fiscal Year	Swiss franc		German mark		Japanese yen	
	Sw F/\$1	Index	DM/\$1	Index	¥/ \$1	Index
1978 I	2.383	100.0	2.265	100.0	255	100.0
II	2.009	84.3	2.076	91.7	220	86.3
1979 I	1.678	70.4	1.961	86.6	200	78.4
II	1.721	72.2	1.874	82.7	206	80.8
1980 I	1.666	69.9	1.820	80.4	226	88.6
II						
(to present)	1.574	66.1	1.718	75.8	234	91.8
1/28/80	1.617	67.9	1.737	76.7	240	94.1

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BORROWING COST SENSITIVITY ANALYSIS

In order to analyze the sensitivity of the dollar-based cost (real cost) of the Bank's Swiss franc, German mark and Japanese yen borrowings over the period FY78/I through FY80/II to possible exchange rate changes over the remaining life of the borrowings, a computer test was devised based on the following assumptions and procedures.

Historical exchange rates were used to convert the currency cash flow stream resulting from a currency borrowing to a dollar stream for the period through FY80/II. The exchange rates prevailing on January 28, 1980 were used for FY80/II.

For the period FY81/I through FY99/I constant (linear) changes in the currency/\$ exchange rates were assumed to reach given final levels in 1999. The forecast dollar equivalent cash flow was obtained using these streams of exchange rates. The final levels in the exchange rates of 1999 were then varied over a range to determine the sensitivity of the dollar-based costs of the borrowings in each of the three currencies.

The results of these sensitivity tests are presented in paragraph 11 of the text and on three attached graphs, (pages 3, 4 and 5) where the dollar-based cost of borrowing is plotted versus the final exchange rate level for 1999 for each of the three currencies.

In order to compare the dollar-based costs for each currency a cash flow stream of hypothetical dollar borrowings was set up such that the maturity, timing and amount of the hypothetical borrowings correspond to the actual Swiss franc, German mark and Japanese yen borrowings converted at the historical exchange rates to dollars.

The dollar-based costs of Swiss franc, German mark and Japanese yen borrowings under varying exchange rate assumptions are then directly comparable to the respective hypothetical dollar borrowing costs for each currency. Note that the hypothetical dollar borrowing costs are independent of future exchange rate variations.

Three points of particular interest are indicated on the attached sensitivity plots:

Point A - corresponds to the assumption of constant exchange rates from FY80/II through FY99/I.

Point B - corresponds to the point at which the hypothetical dollar borrowing and the actual borrowing in the hard currency would have equal cost.

*show the dollar cost assuming*  
*show the per cent by which the dollar could further depreciate against the foreign currency without causing dollar cost of the borrowing to exceed the cost of the foreign borrowing.*

*will further depreciate between now and 1999 (and the result of dollar cost of our borrowings)*

*shows the percent by which the dollar*

Point C - ~~corresponds to a point attempting to capture roughly the exchange rate levels of 1999 predicted solely by the interest rate differentials on long-term government bonds in the different currencies.~~ The long-term semi-annual yields assumed on the various currencies were those of January 28, 1980: 11% on dollars, 5.40% on Swiss francs, 8.25% on German mark and 8.50% on Japanese yen. These differentials in interest rates imply the following exchange rates in 1999: 0.58 Sw F/\$, 1.06 DM/\$ and 153 ¥/\$. It should be noted that such interest rate differentials in medium and long-term markets have not, to date, been accurate predictors of exchange rates in either the short or longer run.

*are to yield equal dollar costs.*

Finally, a sensitivity analysis was also carried out on the aggregate borrowings by assuming that the dollar would depreciate linearly against all three of the currencies at the same rate, to reach a range of levels in 1999. The assumption is that the hard currencies all stay in line with each other throughout the life of the cash flows while the dollar depreciates steadily against each one. The results are presented in the attached plot (page 6). Point A (assuming no further depreciation of the dollar) gives a dollar cost of 7.35% for the total borrowing program. Point B (where the hypothetical all-dollar borrowing cost of 9.42% and the actual hard currency borrowing program cost are equal) indicates that the dollar can still depreciate by almost 40% of its current value against each of the three currencies before the currency borrowing program exceeds the hypothetical all-dollar borrowing program in cost.

We also <sup>plotted</sup> ~~evaluated~~ Point C, <sup>where</sup> ~~assuming~~ the dollar depreciates linearly to the market-implied forward rates of 1999 <sup>for each of the foreign currencies.</sup> for ~~the aggregate borrowings.~~ Point C indicates a dollar-based cost of 9.71% for the ~~currency~~ borrowing program compared to a cost of 9.42% for the hypothetical all-dollar borrowing program, a net additional cost of 0.29%.

*aggregate non-dollar*

## OFFICE MEMORANDUM

TO: Mr. K. Georg Gabriel, Director, PAB

FROM: Lester Nurick, Vice President and General Counsel *LN*

SUBJECT: Cofinancing Paper for Discussion by Finance Committee

DATE: February 11, 1980

The following sets forth some additional comments on this paper.

Paragraph 9. This says that the Bank will have new opportunities to cooperate with the aid agencies of the oil-exporting countries and that the Bank can continue to expand its cooperation with DAC member aid programs. I think some evidence to support this conclusion would be in order.

Paragraph 10. I am not sure I understand the last sentence. First, it is not clear which loans would be too big, the cofinancing agencies' or combined loans for a particular project. Second, I do not understand what it is about cofinancing that would make the "unsuitable" suppliers become suitable.

Paragraph 12. The third sentence could be improved, by giving more of an indication why borrowers might feel that cofinancing with export credit agencies results in adverse financial terms, as follows: "This procedure may ensure that the suppliers selected are the most competitive when judged by the Bank's international competitive bidding criteria. But if contracts to be financed by export credits are awarded on this basis without taking into account the differing financial terms offered in connection with suppliers from different countries, borrowers may feel that the result is less advantageous to them than would have been the case if financial terms had also been compared in deciding which supplier should be selected." I also think that the last sentence can be read as overstating the significance of the results than can be expected from cofinancing with export agencies.

Paragraph 19. The third sentence is inaccurate and should be revised to read as follows: "The Bank has accepted optional cross-default provisions which give it the right, at its option, to exercise its remedies in the event that the cofinancier suspends or accelerates its loan as the result of a default under its loan agreement." The significance of the last sentence is not clear to me.

Paragraph 20. This paragraph is similarly inaccurate and should be revised to read as follows: "The Bank has refused to commit itself in advance to exercise its remedies in the case of a suspension or acceleration by the commercial banks on their loans. It has made it



clear that it reserves the right to decide whether and in what way to take action in such a case." I think it might be useful to describe here the Bank's role as a billing agent in some cofinanced operations.

Paragraph 21. The fifth sentence (about protecting "the market") was not entirely clear to me. I take it that we are talking about the insufficiency of the commercial banks' capital base.

Paragraphs 28 and 29. The first sentence of paragraph 28 is not an adequate explanation in my view of why the Bank does not raise more money by selling participations out of its loan portfolio to commercial banks. Paragraph 28 goes on to refer to the IDB and IFC floating rate cofinancing techniques and paragraph 29 suggests that we should start to use the floating rate technique, but without analysis of the IDB or IFC practice and experience. Will there be such an analysis before we decide how to proceed?

Paragraph 30. Until further consideration has been given to it internally, I think we should strike the last sentence. It would be necessary to consider, for example, the justification for such a new institution, how it could be capitalized, how it would be organized, and what its relationship to the Bank would be.

Paragraph 34. Since the conclusion here is, in effect, that the Bank should not change its practice of not using its guarantee authority, this paragraph could be deleted entirely. If it is to remain, the reasons why the Bank has not used this authority in the past should be spelled out in more detail.

I also have the following minor comments.

Paragraph 5. The third sentence is somewhat confusing. This idea could be reflected in the second sentence by simply adding "and disbursement" after "commitment."

Paragraph 6. The third sentence says that, because DAC members attempt to spread their aid among a number of different countries, small borrowers in particular incur greater administrative costs in dealing with an array of external agencies. The next sentence says that cofinancing reduces the administrative burden on the borrower. Presumably what is meant is that, assuming DAC members are going to continue to spread their aid among a number of countries and sectors, it is better to combine their small contributions into large projects through cofinancing than to simply expand the number of projects. The presentation could be improved.

Paragraph 16. It is stated that commercial banks may not continue to be able and willing to supply funds to developing countries in the volume and at the terms required, and goes on to say that cofinancing with the Bank can "mitigate these difficulties." If there is a question of the commercial banks' ability to lend (either because of a lack of funds or restrictions imposed by national authorities), it would not seem to be possible for the Bank to mitigate this difficulty. If we think we can overcome their unwillingness to lend, why is this so? Aside from later assertions that the Bank has "introduced" borrowers to lenders, there is nothing said about why the Bank has been successful in doing this, or will be successful in the future if the Bank does IFC-style cofinancing.

Paragraph 17. The description of the specialized staff assisting with cofinancing should be supplemented by making reference to the new role of the Legal Department. We suggest that the second sentence begin as follows: "The specialized cofinancing staff, which is now being reinforced by a special cofinancing unit in the Legal Department, initiates contacts..."

Paragraph 27. I would be reluctant to make the claim in the next to last sentence that close cooperation with the Bank would "ensure" the effective use of commercial bank loans. The most that should be said is that if commercial bank loans are used to finance programs agreed between the Bank and the borrower, this should be more effective than unrestricted loans by commercial banks to the same country.

cc: Mr. Robert S. McNamara ✓  
Members of the Finance Committee

PHeininger /LNurick:lc