

94 006

Faculty of Economics and Econometrics
Department of Financial and Management Accounting

05348

SERIE RESEARCH MEMORANDA

Cost Accounting in Banking

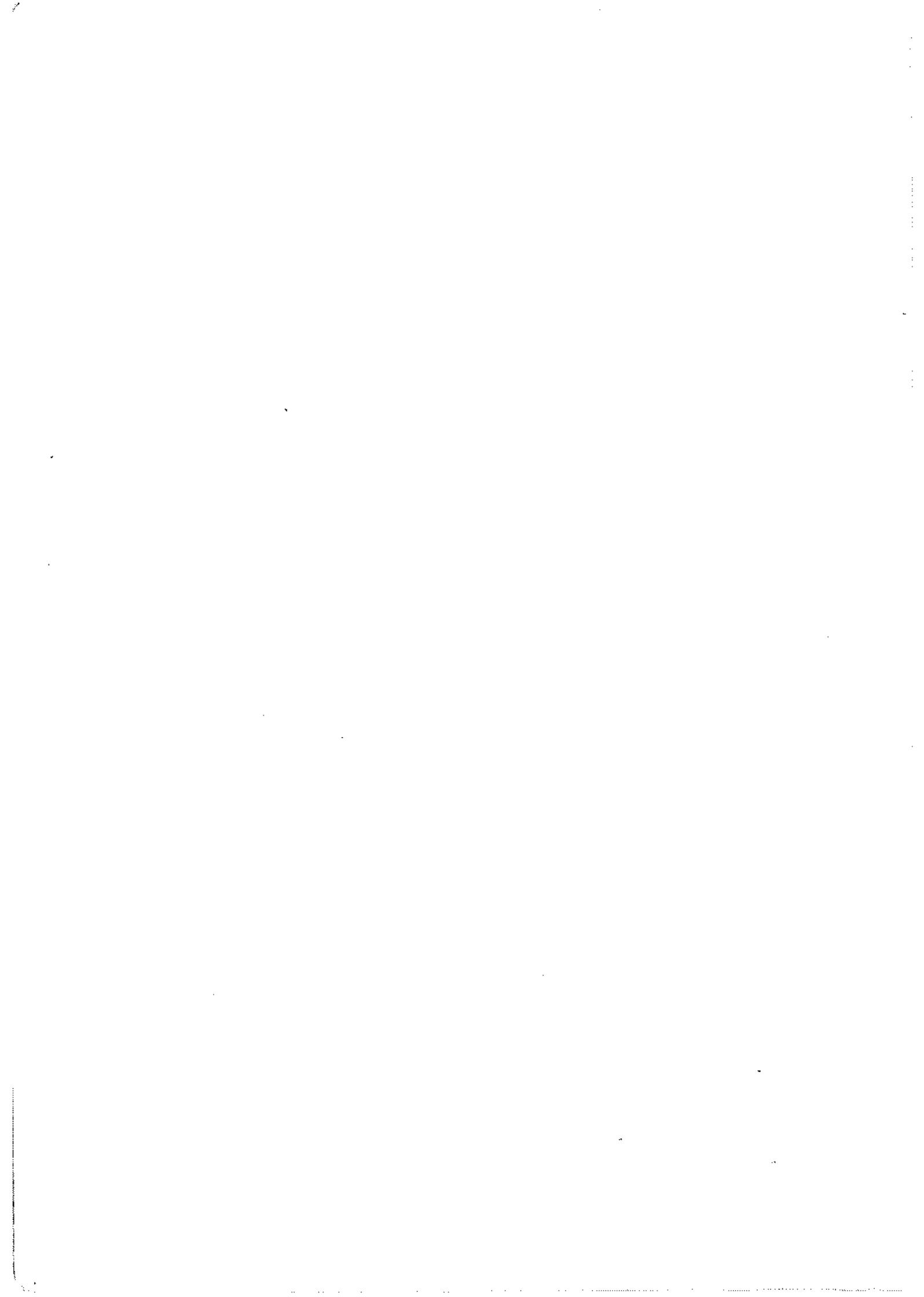
**Jan J. Bos
Bert Bruggink
Esther Ijskes**

Serie Research Memoranda 1994-6

March 1994

vrije Universiteit *amsterdam*





Cost Accounting in Banking

Paper to be presented at the 17th Annual Congress of the European Accounting Association.

**Jan J. Bos
Bert Bruggink
Esther IJskes**



**University of Twente
School of Management Studies
P.O. Box 217
7500 AE Enschede
The Netherlands
phone: +31-53-893 548
fax: +31-53-339 885
email: j.j.bos@sms.utwente.nl**

**Vrije Universiteit Amsterdam
Department of Economics and Econometrics
De Boelelaan 1105
1081 HV Amsterdam
The Netherlands
phone: +31-20-548 5470
fax: +31-20-646 2645
email: eijskes@econ.vu.nl**

Comments on this paper are appreciated by the authors, and can be sent to one of the addresses above.



Cost Accounting in Banking

Jan J. Bos, Bert Bruggink, and Esther IJskes¹

Due to changes in banking regulation (for example the BIS-convergence of capital measurement and capital standards), developments in technological and financial innovations, inverse interest rate structure, high volatilities on financial markets, and the fierce competition between financial institutions, a considerable amount of attention has been paid to profitability analysis in banking.

Profitability analysis is an important instrument for performance measurement and control. Profitability analysis provides management with a judgement of the business before the market does; a lack of insight in customer profitability, product profitability and the profitability of responsibility centers will result in a lack of opportunities for management control.

This paper concerns the current theory and practice on profitability analysis in banking, its shortcomings and possibilities. The outline of this paper is as follows. In the first part of the paper we will describe the context in which profitability analysis in banks is placed. The second part concerns the allocation of the net interest margin. The allocation of the net interest margin to the banking operations is referred to as funds transfer pricing. The goals of funds transfer pricing are:

- support asset and liability pricing;
- support the profitability analysis of products, clients and profitability centers; and
- support the analysis of the net interest margin.

In this part of the paper a method for interest allocation based on market opportunities is introduced — the matched opportunity rate method —. This method is based on the premise that every transaction between customer and bank contributes to bank income and should therefore be recognized as an independent source of income.

In the third part of the paper concerns the operational costs. Due to management's awareness that operational costs are relatively well controllable, operational costs received much attention in recent literature.

In banking practice, most of the present cost accounting systems were designed to provide information on long-term product costs. The problems and shortcomings of these systems, caused by the proportioning fixed costs and the allocation of indirect costs, will be discussed. Transparency of the cost structure will turn out to be the most important requirement of an effective accounting system for management control.

The structure and behavior of bank costs render most traditional cost accounting methods irrelevant. In this part the authors will present a concept that pays due respect to both cost structure and cost behavior and that provides the basis for special purposes like performance measurement and management control. This concept combines Riebel's (1972) hierarchy of calculation objects with the activities and cost drivers found in Activity-based costing.

¹ Ir J.J. Bos is a researcher at the University of Twente. Dr A. Bruggink is associate professor of Management Control and Auditing at the University of Twente. Drs E. IJskes is assistant professor in Management Accounting at the Department of Economics and Econometrics of the Vrije Universiteit Amsterdam. The authors perform research on management accounting in banks.

Comments on this paper are appreciated by the authors and can be sent to: J.J. Bos, University of Twente, School of Management Studies, P.O. Box 217, 7500 AE Enschede, The Netherlands, or E. IJskes, Vrije Universiteit, Department of Economics and Econometrics, De Boelelaan 1105, 1081 HV Amsterdam, The Netherlands.



Cost Accounting in Banking

Jan Bos, Bert Bruggink, and Esther IJskes²

Part I Introduction

1. Introduction

Profitability analysis in banking has received a considerable amount of attention last years, due to:

1. bankruptcies of savings and loan institutions in the United States;
2. the cancellation of regulation on interest ceilings and (international) mergers and acquisitions;
3. the inverse interest structure in the periode 1989-1993 in a number of Western European countries;
4. increased development of international banking on an increasingly local and retail level;
5. significant bank leadership positions held by innovative, aggressive, and performance-oriented managers;
6. development and extensive use of asset and liability management, including the purchase of liquidity instruments, negotiable certificates of deposits and Eurodollar borrowings;
7. increasing use of computer based electronic financial services and funds transfer systems, as well as financial planning and decision making models;
8. increasing need for capital to support expansion and diversification (Bank of International Settlements: International convergence of capital measurement and capital standards);
9. changes in the cost and availability of bank funds; and
10. increasing competition for funds and customers from (other) financial institutions, as insurance companies and pension funds, as well as near-banks and non-banks.

This paper concerns profitability analysis. The aims of profitability analysis can be, among others, performance measurement and management control. These aims determine the accounting principles and procedures and the level of analysis.

The questions which indicator should be used to measure overall performance in banking remains to be answered. It seems obvious to use profitability as the most important performance measure. Profitability is obviously necessary for the organization's continued existence because of the on-going need to pay dividends, to fund the firm's future growth and for the capacity to absorb risks. In spite of the considerable difficulties in defining and calculating profitability in banks, it can be seen as the extent to which the organizational unit, product, or customer contributes to overall organizational profitability. Overall organizational profitability is consequently defined as the ratio of income to operational costs. It is often stressed that short-term financial measures, like this ratio,

² Ir J.J. Bos is a researcher at the University of Twente. Dr A. Bruggink is associate professor of Management Control and Auditing at the University of Twente. Drs E. IJskes is assistant professor in Management Accounting at the Department of Economics and Econometrics of the Vrije Universiteit Amsterdam. The authors perform research on management accounting in banks.

have become invalid indicators of the recent performance of an organization, especially in cases of reduction of the share of direct labor cost in end products, increased capital intensity of production processes and the considerable contribution to an organization's success provided by its stock of knowledge and intangible resources. This problem will however be covered by subdividing this measure into partly nonfinancial long-term measures, and by introducing the funds transfer price, which might include all kinds of long-term financial goals, such as the balance sheet structure, risk exposure and solvency.

In conclusion, the individual ratio may be meaningless, but, as an aggregate measure, the income-to-operational costs ratio does indeed make sense as a long-term yardstick. However, this statement provokes a further question to be answered, namely, which cross-section of a banking organization is most useful in profitability analysis. Although it is obvious that organizational profitability is the ultimate measure of organizational success, from the point of view of control other cross-sections might prove to be more suitable (Bruggink 1989, p.124; Rolfes and Kramer 1988, p.124-125).³ As substitutes we can suggest a product orientation or a customer orientation. The yardstick *customer profitability* is in some way appealing, knowing that the quality of customers largely determines the performance of banking institutions. Nevertheless, the concept of product profitability has become popular. The reason for this might be the enormous increase in customer number, the enormous growth in the number and kinds of banking products, and the enormous expansion in different kinds of off-balance activities. These developments in particular, limit the feasibility of using the indicator customer profitability as a primary measure in profitability analysis. Therefore a solution is often adopted which is perhaps less attractive from a theoretical point of view: the concept of product profitability. It is worth noting that product profitability links on in subject-matter to the competences and responsibilities of product management in contrast to customer profitability. Also, product profitability is better influenceable and controllable and is more closely related to the profitability of organizational units.

The outline of this paper is as follows. First, an introduction to cost accounting in banking is given. Banking costs and revenues, calculation objects, and problems in profitability analysis will be discussed. Part II is aimed at funds transfer pricing. Part III concerns the allocation of the operational costs. Finally a conclusion will be presented.

2. Cost accounting in banks

Banking costs and revenues

The main cost and revenue categories in a bank are interest income, fee income, risk costs and organizational costs. Interest income is the most important source of income. Net interest income or net interest margin is defined as the difference between interest revenues and expenses.

³ In German: "... nach funktionalen Kriterien insbesondere für den Bankbetrieb weniger geeignet, da hier die typischen Funktionen der Beschaffung von Einsatzfaktoren, der Produktion und des Absatzes von Bankleistungen wegen der großen Bedeutung der monetären Faktoren und der damit eingehende Verketzung von Kredit- und Einlagengeschäft auf der einen sowie von Produktion und Absatz der Leistungen auf der anderen Seite kaum voneinander abzugrenzen sind."

Interest revenues and expenses are related to the underlying value, which is expressed in a nominal interest rate times a nominal capital.

Fee income refers to the services charged to customers. Generally, fees can be charged for separate bank services, like payments or cheques, or connected to loans and deposits transactions. The fees connected to banking operations can be fixed per transaction or value-based. In either case service charges can easily be traced to financial services.

Organizational costs relate to all the activities and arrangements necessary to supply the financial services, and can be divided in costs of operations and overhead. Costs of operations are related to the production of the financial services, like costs of labor, housing, computer costs.

Calculation objects

In the ideal situation we would be able to trace all costs and revenues to individual services performed by the bank. The individual services or product units, are the final calculation objects. We prefer calling them calculation objects instead of cost objects, because costs and revenues are allocated to them. If the profit contribution of each service is known, the profit contributions for a client(group), product(group), distribution channel, organizational unit, and any other cross-section can easily be determined.⁴ However, a large share of costs does not have a direct relationship with transactions, but they do have a direct relationship to some other calculation object.

Problems in profitability analysis

Some of the costs and revenues can easily be traced to services. Usually fees are directly related to services performed. The allocation of all other costs and revenues causes problems as will be discussed below.

Although interest revenues and expenses are transaction related, two problems arise. In the first place the long-term character of loans and deposits causes problems. The transaction with the customer is not completed until years later, as a result of which the impact of these transactions on profitability will not be known until many years in the future (Anthony, Dearden and Govindarajan 1992, p.832). Another problem concerns funds transfer pricing. The interest has to be off-set by a transfer price, causing a cost against an interest revenue for loans, and a revenue against interest expenses for deposits. Funds transfer pricing is covered in Part II of the paper.

A third problem is the relatedness of the products and services. For example, for almost all kinds of financial services an account is necessary; some other products combine several financial services, e.g. a credit card combines paying and lending. The relatedness of products is even more difficult if these products are not separately and independently priced, which results in cross-subsidization. This means that some products generate small profits or even losses, while other generate excess profits. In this situation client profitability is very important, since a bank would not mind to sell a less profitable service to a customer if this customer also buys high-profit products. The relatedness of products causes a problem in the profitability analysis of individual financial services.

⁴ Empirical research of Gardner and Lammers (1988) shows that product profitability (total product costs and revenues and direct product costs and revenues) is considered of high value by bank officers. Information on responsibility center profitability and costs of activities follows in the second place. Surprisingly, they report that customer profitability and standard costs are considered less important.

A final problem is the allocation of operational costs. Since activities are performed in order to deliver the services, the costs of these activities should be allocated to these services. However, this implies some difficulties, since operational costs tend to be indirect, common, and fixed of nature. This is further discussed in Part III.

Part II Interest

In banks, funds are generated by the deposit function and used by the lending function. Borrowing funds, or deposits, causes interest expenses, while using funds, or loans, generates interest revenues. The allocation of the net interest margin to the loans and deposits is referred to as funds transfer pricing. Funds transfer pricing is a very important device in profitability analysis, because interest is a bank's main source of income.

In this part of the paper a funds transfer pricing system using market opportunities, will be presented. The first paragraph concerns the goals of a transfer pricing system and a short description of traditional method for funds transfer pricing. In the paragraphs 2 and 3 the matched opportunity rate method will be presented. At the end of this part of the paper contains some concluding remarks.

1. Funds transfer pricing

A transfer price is a revenue for the internal provider of funds and a cost for the internal buyer/user of funds. The interest margin on a loan is defined as the difference between the interest revenues and the allocated interest costs. For deposits it is the other way around: the difference between the allocated interest revenues and the interest costs. The interest margin is the gross margin of a transaction⁵. The net margin of a transaction is calculated by subtracting the operational costs and costs of risk from the gross margin (Schierenbeck and Rolfes 1988, p.11).

Goals

The goals of a funds transfer pricing system are the same as for any transfer price system. The transfer prices should guide decision making and assist performance measurement (Kaplan and Atkinson 1989, p.596). The goals of funds transfer pricing therefore are (Fitz 1988, p.74):

- (1) support asset and liability pricing;
- (2) support the profitability analysis of products, clients, and profit centers; and
- (3) support the analysis of the bank's net interest margin.

Additionally, a funds transfer price system should (Schierenbeck and Rolfes 1988, pp.16-19):

- (4) be fair and acceptable to the people who have to work with it;
- (5) fit in the financial accounting system; and
- (6) be easy to apply.

Methods of funds transfer pricing

Funds transfer pricing is considered an important issue, because interest is the main source of income to a bank. Different methods of interest allocation have been proposed.⁶ A very simple method is the single pool method. In this method all lending and deposit products are allocated an

⁵ A transaction is an individual deposit or loan, or stated otherwise a product unit.

⁶ For descriptions of the traditional methods see Haskins and Sells (1972), Tewes (1976), Schierenbeck (1985), and Fitz (1988).

interest rate based on average cost of funds (cost-based variant) or marginal costs (market-based variant). The interest margin of transactions is calculated by the difference between the nominal interest rate of the transactions and the transfer rate, multiplied by the nominal value of the transaction.

A more advanced method is the multiple pool method. All sources and uses of funds are categorized in different pools based on their characteristics, like maturity, interest rate sensitivity, etc. It is assumed that loans from a certain pool are funded with deposits from the same pool. For each pool a transfer rate is calculated. This transfer rate, as with the single pool method, can be cost-based or market-based.

These methods have different problems. In the first place the cost-based variant of both methods reflect historical averages, which can be misleading in pricing decisions. Some authors argue that a marginal approach is preferable, but the use of short-term interest rates, as they suggest, is also misleading in pricing decisions. Another problem is that the profit contribution of a single transaction changes over time, due to the changes in the transfer rate. An additional problem with the multiple pool method is the categorization of funds in pools.

As indicated by Haskins & Sells (1972), and by Chisholm and Duncan (1985), and Fitz (1988), one should use market opportunities for profitability reporting. These ideas are explicitly articulated since the 1980's, especially in German literature.⁷ The next section will elaborate on this.

2. Matched opportunity rate method

The matched opportunity rate method (MOR-method) is based on the premise that every transaction between a customer and the bank contributes to bank income and therefore should be recognized as an independent source of income (Schierenbeck 1985, p.84). This contribution to bank income has two components: the customer contribution and the mismatch contribution.⁸ The *customer contribution*, or transaction contribution, is defined as the excess contribution of a transaction with a customer over a comparable transaction at the money and capital market. The mismatch contribution of a transaction is defined as the contribution of the transaction to the mismatched position of the bank's balance sheet. In this paper we will not elaborate on the bank's mismatch position, but concentrate on the customer contribution.

The contribution of a customer transaction is calculated based on the *opportunity principle*. It is assumed that if funds were not purchased from a customer (deposit), they should have been purchased on the money market, so the opportunity cost is the market borrowing rate. Also, funds that are not invested in a customer (loan), have to be invested in the market, so the opportunity revenue is the market lending rate. Thus, a customer loan is compared to a market loan, and a customer deposit is compared to a market deposit. The customer contribution is defined as the

⁷ The theory on interest allocation received a lot of attention in German literature. Especially Schierenbeck, Rolfes and Marusev published extensively on the development of the MOR-method. A good overview (in German language) can be found in Schierenbeck and Rolfes (1988).

⁸ In German the customer contribution is called the Konditionsbeitrag; the mismatch contribution is called Strukturbeitrag.

excess contribution of the customer transaction over a comparable transaction at the money market.

customer loan contribution = (customer lending rate -/- market lending rate) * volume
 customer deposit contribution = (market borrowing rate -/- customer borrowing rate) * volume

The basic model of the MOR-method is illustrated with the following example.

Example:

Loans:	Deposits:
300,000 for 5 year at 8%	100,000 for 5 years at 7%
200,000 for 3 year at 7%	150,000 for 3 years at 6%
100,000 for 1 year at 6%	350,000 for 1 years at 5%

Market interest rates:	1-year rate	5.25 %
	3-years rate	6.1%
	5-years rate	7.25%

Loans:	Deposits:
300,000 @ (8%-7.25%) = 2,250	100,000 @ (7.25%-7%) = 250
200,000 @ (7%-6.1%) = 1,800	150,000 @ (6.1%-6%) = 150
100,000 @ (6%-5.25%) = 750	350,000 @ (5.25%-5%) = 875
loan contribution = 4,800	deposit contribution = 1,275

total customer contribution = 4,800 + 1,275 = 6,075

mismatch contribution = net interest income - total customer contribution = 10,500 - 6,075 = 4,425

In the example above, the interest margin of a transaction is calculated as the difference between the nominal customer interest rate and the nominal market interest rate, multiplied by the nominal capital. This approach is called the basic model of the MOR-method, because it uses nominal rates and nominal capitals. This approach will lead to misleading profitability information if the nominal conditions do not represent the effective conditions. When, for example, the annual interest is paid on a monthly basis, the effective yield of the transaction will differ from the nominal yield. A direct comparison based on nominal conditions is only justified when the effective yield on the transaction equals the nominal interest rate, and the effective invested capital equals the nominal capital or book value.

These circumstances generally do not exist. In the first place the effective yield on the customer transaction is determined by the timing and the amounts of the interest and debt payments. In case of intermediate interest payments or other revenues than interest, e.g a discount, the effective yield will differ from the nominal interest rate. The capital basis to which the interest rate is related, will differ from the nominal capital basis if intermediate amortization takes place.

To overcome these limitations, a new approach to the MOR-method is developed. This approach will be described in the next paragraph.

3. Present value approach of the matched opportunity rate method

In the preceding paragraph the customer contribution is defined as the excess contribution over a market transaction. This excess contribution is calculated on an annual basis. The present value approach of the MOR-method takes a different perspective. In the first place, the customer transaction is compared to a *cashflow congruent* market transaction. This implies that the future cashflows of the market transactions are exactly the same as the future cashflows of the customer transaction. Secondly, the customer contribution is determined by the difference between the cashflows of the customer and market transaction at the date of origination. This difference reflects the present value of the future annual transaction contributions.

The annual customer contribution is determined by allocation of the excess present value or present value of the future customer contributions, over the maturity of the transaction. For this, different approaches can be chosen (Schierenbeck and Wiedemann 1993a, p.672):

- no allocation over the maturity: the contribution is allocated to the period of origination of the transaction;
- time-proportionate allocation: by using annuities an equal amount is allocated to each period;
- capital-proportionate allocation: the excess value is allocated based on the book value or the effective capital of each period; or
- cost-proportionate allocation: the excess value is allocated in direct relationship to the other costs originated in different periods.

In this paper we will use a capital-proportionate allocation. With a capital-proportionate allocation the annual customer contribution is a constant percentage of invested capital. The excess value of the customer transaction is the present value of the future customer contributions. If this excess value is related to capital, the present value of this capital should be used. This results in the following formula for calculating the interest margin (Marusev 1988, p.38):

$$\text{Interest margin} = \text{excess value of the customer transaction} / \text{present value of the average annual capital}$$

The procedure described above will be presented using the following steps and the example:

1. determine the excess value of the customer transaction over the market transaction;
2. determine the capital basis of the customer transaction; and
3. determine the net interest margin on the transaction.

Example

A bank gives a customer a loan under the following conditions:

\$ 300,000 at t_0 at a nominal interest rate of 8%

\$ 100,000 repayment at t_1

\$ 100,000 repayment at t_2

\$ 100,000 repayment at t_3

Market rates

1-years 5.25%

2-years 5.75%

3-years

6.1%

Step 1: excess present value

As said before, the market transaction should be completely comparable in the cashflow pattern. The extent and timing of the cashflows of the transaction with the customer should be determined. The cashflows are:

t_0 :		-300,000
t_1 :	$100,000 + 8\% \cdot 300,000 =$	124,000
t_2 :	$100,000 + 8\% \cdot 200,000 =$	116,000
t_3 :	$100,000 + 8\% \cdot 100,000 =$	108,000

The market transaction must have exactly the same future cashflows. Such a transaction will usually not be directly available on the money market. Therefore, this transaction should be constructed using the market interest rates that are available.

At t_3 a cash inflow of 108,000 takes place. This cashflow could be generated by a (lending) market transaction at t_0 of $108,000 \cdot 1.061^{-1} = 101,790.76$. This transaction would generate an interest cash inflow at t_1 and t_2 of $0.061 \cdot 101,760.76 = 6,209.24$.

with 6.1% begin 3 years later when 1,061 ea. alle jaar aan rente ontvangen van 6.1%
= dat begint toch niet

t_0	t_1	t_2	t_3
-101,790.76	6,209.24	6,209.24	108,000

At t_2 a cash inflow of 116,000 takes place. With the preceding transaction, already 6,209.24 is received, so the second market transaction has to generate a cashinflow at t_2 of $116,000 - 6,209.24 = 109,790.76$. This will be the case with a (lending) market transaction at t_0 of $109,790.76 \cdot 1.0575^{-1} = 103,821.05$. This transaction will generate a interest cashinflow at t_1 of $0.0575 \cdot 103,821.05 = 5,969.71$.

t_0	t_1	t_2
-103,821.05	5,969.71	109,790.76

Finally, a cashinflow at t_1 of 124,000 has to be constructed. At t_1 interest cashinflows from the preceding two transactions are received, totalling $6,209.24 + 5,969.71 = 12,178.95$. The market transaction to be constructed should generate $124,000 - 12,178.95 = 111,821.05$. This will be the case if at t_0 $111,821.05 \cdot 1.0525^{-1} = 106,243.28$ is lent to the market.

t_0	t_1
-106,243.28	111,821.05

This three transactions together generate exactly the same cashflow pattern as the customer

transaction.

t_0	t_1	t_2	t_3
-101,790.76	6,209.24	6,209.24	108,000
-103,821.05	5,969.71	109,790.76	
-106,243.28	111,821.05		
311,855.09	124,000	116,000	108,000

This shows very clearly that in order to receive the same future cashflow, the bank has to lend \$ 311,855.09 to the money market, while it has to lend only \$ 300,000 to the customer. The excess value, $300,000 - 310,064.33 = 10,064.33$, is the present value of the future customer contributions.

The excess value can also be calculated by multiplying the cashflows with the zerobond discount factors. These zerobond discount factors are calculated in Appendix 1. The excess value, then, is calculated as follows:

t_0 :		-300,000.00
t_1 :	$124,000 * ZB_1 = 124,000 * 0.95011876 =$	117,814.73
t_2 :	$116,000 * ZB_2 = 116,000 * 0.89396517 =$	103,699.96
t_3 :	$108,000 * ZB_3 = 324,000 * 0.83648528 =$	90,340.41
Excess Value	<i>10,064.33</i>	11,855.10

Step 2: the capital basis

Since the amortization takes place at the end of each year, the average capital during the first year is \$ 300,000, during the second year \$ 200,000, and during the third year \$ 100,000. The present value of the average annual capital is \$ 547,477.19.

year 1:	$300,000 * ZB_1 = 300,000 * 0.95011876 =$	285,035.63
year 2:	$200,000 * ZB_2 = 200,000 * 0.89396517 =$	178,793.03
year 3:	$100,000 * ZB_3 = 100,000 * 0.83648528 =$	83,648.53
Total		547,477.19

Step 3: the interest margin

The last step is calculating the interest margin of this transaction, by dividing the excess value — the outcome of step 1 — by the present value of the average annual capital — the outcome of step 2. This results in $11,855.10 / 547,477.19 = 2.165405\%$.

The annual customer contribution can be calculated by multiplying the contribution yield with a certain year's average nominal capital.

year 1:	$2.165405\% * 285,035.63 =$	6,496.21
year 2:	$2.165405\% * 178,793.03 =$	4,330.81

year 3: $2.165405\% \cdot 83,648.53 =$

2,165.40

4. Practice

Although in literature the application of the MOR-method is not described frequently, there is reason to believe that it is applied widely. In a survey among 201 financial institutions in West Germany in 1991, Kodlin (1992) reports that 46% already uses the MOR-method and that another 40% is preparing to do so. Kodlin also indicates that the matched opportunity rate is registered for branches, clients and products (85%) and in 95% for transactions. Unfortunately Kodlin does not report if these banks use (a variant of) the basic model of the MOR-method, or apply more advanced concepts, like the present value approach described in this paper.

5. Concluding remarks

In this part of the paper an approach to calculate the profit contribution of separate customer transactions, is presented. The main advantage of the present value approach of the MOR-method is that the exact profit contribution of complicated financial services can be determined. However there are some problems to be mentioned. In the first place, if the future cashflow pattern is uncertain, for example if early redemption is allowed, it is not possible to construct a cashflow congruent market transaction. The same holds when market rates for certain maturities are not available, which might happen with long-term loans. Another problem is the treatment of variable rated transactions and funds with a formal maturity of zero. Enough chances to elaborate on in further papers.

Part III Operational costs

1. Introduction

Due to increasing competition in general and increasing costs of funds in particular, interest margins are declining. Increasing fee income is possible on a limited scale only, which implies that banks will have to reduce costs to maintain their level of profitability. The most successful banks in the 1990s are the ones that control their costs best.⁹

The structure and behavior of bank costs render most traditional cost accounting methods irrelevant. In this part the authors will present a concept that pays due respect to both *cost structure* and *cost behavior* and that provides the basis for special purposes like performance measurement and management control. This concept combines Riebel's (1972) *hierarchy of calculation objects* with the activities and *cost drivers* found in Activity-based costing (ABC). First, the cost structure and cost behavior is discussed (paragraph 2). Second, different purposes of cost accounting systems are given (paragraph 3). In paragraph 4 we introduce the concept combining Riebel's hierarchy of calculation objects and ABC's focus on processes. The last paragraphs deal with performance measurement (i.e. product costing) and management control respectively.

2. Characterization of bank costs

Cost structure

Banks are characterized by a high percentage of labor costs. This percentage has been gradually declining during the last few years, mainly due to automation of standard business processes (e.g. Automatic Teller Machines). In figure 1 the relative weight of different cost categories is shown for a large Dutch bank.

An effective accounting system does not only provide information on categories of costs, but also on the profitability (revenues -/- costs) of different calculation objects within the organization. These objects range from a product unit, a product type, a client, to a client segment, or a responsibility center.

The identification of relevant calculation objects and the question what costs should be allocated to them, depends on the purpose of the calculation. For the purpose of management control we are interested in responsibility centers (calculation object) and will allocate only controllable costs. For the purpose of product costing, however, we take products or (calculation object) and generally allocate all costs (full costing).

To model the cost structure, the conceptual framework developed by Riebel (1972) is presented in paragraph 4.

⁹ Künstel and Schardt (1992, p.93): "Die Schlacht der Zukunft wird auf der Kostenseite geschlagen."

Cost behavior

Knowledge of cost categories and the costs (and revenues) of calculation objects is not sufficient when developing a cost accounting system. In fact, the description of categories and objects is static and ignores the dynamic aspects, namely the factors that drives (changes in) costs. A thorough understanding of what makes costs change is a necessity as well. Here, a distinction can be made between changes in the short run and changes in the long run.

Since financial institutions hardly use any materials, only a small part of costs is variable (paper for contracts, paper for account information, electricity, water). Some authors mistakenly consider labor costs directly related to the opening of an new account as variable costs. Generally, however, total labor costs of a bank do not change because of an extra account. Labor costs can be labeled as discretionary costs. In fact, even the introduction of a new product does not change total costs in the short run. Similarly, the elimination of a non-profitable product results in a further decline of profitability, when capacity is not reduced accordingly.

ABC is based on the assumption that activities consume resources, and thus cause costs. The more activities are performed the more resources are used. A cost driver is used to indicate the total consumption of resources. A valid cost driver of the activity 'opening an account' is the number of accounts opened.

3. Cost accounting and different purposes

The identification of calculation objects and the amount of costs allocated to them depends on the purpose of a calculation. Johnson and Kaplan (1987) advise different cost accounting systems for different purposes, because they demand different time periods for reporting, different categories of fixed and variable cost, differing degrees of traceability and allocation, different sets of relevant costs, and different audiences (Johnson and Kaplan 1987, p.228; Kaplan 1988). Johnson en Kaplan make a distinction between the following purposes:

1. allocate costs for periodic financial statements;
2. facilitate process control;
3. compute product costs;
4. support special studies.

A similar distinction is found with Horgren and Foster (1991, p.3)

Cost category	1992 (%)
labor	55%
administration & automation	22%
buildings & facilities	4%
advertising	3%
management costs	9%
depreciation	7%
	100%

Figure 1 Cost categories

Allocating costs for periodic financial statements is generally concerned with valuing inventory, a purpose that is not relevant to banks. Since the introduction of ABC, the purpose of long-term product costing has received a lot of publicity (Johnson and Kaplan 1987; Shank and Govindarajan 1989). By definition, it is not easy to build a cost accounting for special studies. For purposes of process control, Johnson and Kaplan emphasize the use of operational instead of cost information. Johnson and Kaplan seem to focus on those planning and control activities that are called task (operational) control in the analytical framework of Anthony (Anthony, Dearden and Govindarajan 1992, p.15).

Although theorists like Johnson and Kaplan have advocated different systems for different purposes, practitioners have never been charmed by the idea (Kaplan 1990, p.22). The concept of a *basic accounting system* independent of any purpose (german: *zweckneutrale Grundrechnung*), that was developed by Riebel (1972) seems to help closing the gap between theory and practice. This accounting system forms the basis on which different special purpose systems can be integrated. In the paragraph 4 this concept is discussed in more detail.

4. Conceptual framework: hierarchy of calculation objects

To model the (static) structure of costs, Riebel's (1972) concept of a *hierarchy of calculation objects* proves useful.¹⁰ To get a grasp of the strengths and weaknesses within the result, costs can be divided according to different dimensions. Relevant dimensions are product, client and responsibility center. For each dimension a relevant hierarchy can be defined. A product hierarchy is used when calculating product profitability. In figure 2 a product hierarchy is presented.

To keep cost structure transparent, costs should be assigned to the level in the product hierarchy where they have a direct relationship. Costs should be assigned to the lowest level to which they are directly related.

In the first part of this paper we stated that interest can be traced directly to a product unit (e.g. the savings account of Mr. Z). This is the lowest level of the hierarchy of calculation objects. Some costs can be traced directly to the unit level as well. These are costs of activities (also used: processes) that are caused by the units. The processes that have a direct relationship to a product unit are called *primary processes*. The costs having a direct

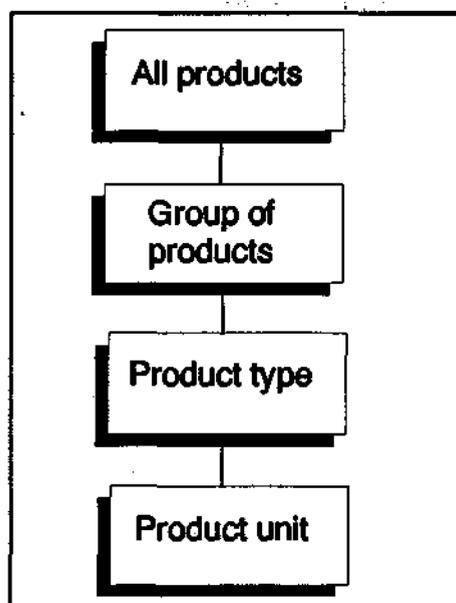


Figure 2 Product hierarchy

¹⁰ The hierarchy of calculation objects is a component of the Relative Einzelkostenmethode, which will be discussed in more detail in paragraph 6.

relationship with these processes are called *prime costs*. Prime costs consist primarily of direct labor costs, while the percentage of direct material costs is minimal. The costs of opening an account or the costs of a transaction at an automated teller machines (ATMs) are examples.

Most costs, however, are not related to product units. Part of the costs are related to a specific type of product. The costs of developing and introducing a new product do not have a direct relation to one unit of product, but relate to a specific type of product. On an even higher level one finds costs related to more than one type of product. The calculation objects on this level are numerous, but have in common that they all relate to a (limited) group of products. Examples are marketing costs that relate to a product line instead of a single type of product. ATMs also have a relationship to a group of products. The same holds for the manager responsible for the business client business: his salary costs have a relationship with the combination of all business client products.

The highest level in the hierarchy of calculation objects relates to all products. Examples are costs of the board of directors, the building and the security guard. In figure 3 the examples of costs on different levels are listed once more. As will be explored later, it depends on the purposes of the calculation whether costs will be allocated to a lower level. For the purpose of product costing, costs from higher levels will have to be allocated to the product unit level.

To get a thorough understanding of what drives costs, it is suggested to complement the static structure of the hierarchy with dynamic — behavioral — aspects. For that reason we advocate calculating the costs of activities first. Further, each activity must be assigned to the calculation object to which it has a direct relationship.

Summarizing, we propose the following order for cost calculations:

1. define activities and determine their costs;
2. assign activities to calculation objects;
3. depending on the purpose of the calculation: allocate costs to calculation objects on lower levels.

A conceptual framework is presented in figure 4.

In a similar way client profitability can be calculated. The relevant hierarchy is different from the one presented in figure 2. Instead of assigning activities to calculation objects of the product hierarchy, they have to be assigned to those in the client hierarchy. To be used in both product and client calculations, each activity receives two earmarks.

level	cost (example)
all products	<ul style="list-style-type: none"> • board of directors • security guard
group of products	<ul style="list-style-type: none"> • marketing product line X • ATM • manager of business client business
product type	<ul style="list-style-type: none"> • development product type Y • introduction
product unit	<ul style="list-style-type: none"> • opening of account Mr. Z • cash deposit

Figure 3 Cost on different levels

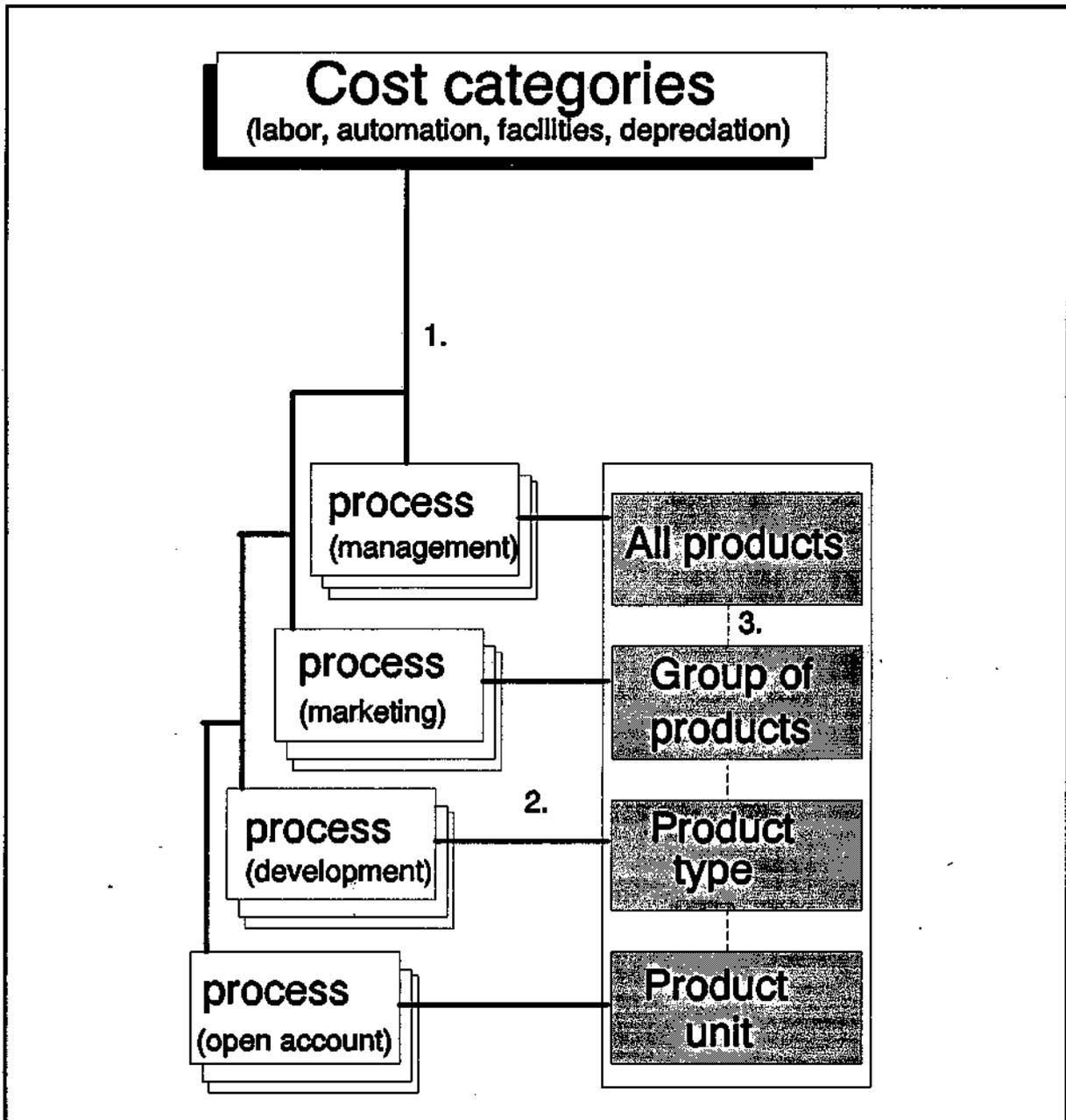


Figure 4 Conceptual framework cost accounting system

The relevant client hierarchy is presented in figure 5.

Looking at both figure 2 and 5, the product unit level is the lowest in both hierarchies.¹¹ A product unit (the savings account of Mr. Z) has a direct relation to both a client and a type of product.

¹¹ Germans refer to a product unit as *Einzelgeschäft*, meaning the single transaction of a product between the bank to a customer.

5. Product costing

In this paragraph we will pay attention to some of the difficulties a bank has to deal with while calculating product costs. The usefulness of ABC is also discussed.

Calculating product costs has always been the main purpose of cost calculation in financial institutions. For this purposes the distinction between direct and indirect costs is relevant. Typically, the cost structure of financial institutions is characterized by the high percentage of indirect costs. When indirect costs are defined as costs related to more than one type of products, this characterization is true.

Most of the indirect costs are common costs; only a fraction are joint costs. In the case of common costs there is no technical necessity that the costs relate to more than one type of product. The costs are common for reasons of efficiency. Although it is possible to have a special (ATM) for different types of accounts or credit cards, banks will normally restrain from doing that. In theory it would just as well be possible to have employees work on single product types. In reality, however, employees perform actions on different products.

In the remainder of this paragraph we will explore the possibilities of ABC in financial institutions. ABC was introduced as an improvement to allocate indirect costs to products in order to provide management with adequate product costs. The rise of ABC can be seen as an improvement to allocate indirect costs to products. Traditional cost accounting systems normally allocate costs on the basis of prime costs.

The irrelevance of traditional cost accounting systems is blamed on the changed cost structure of businesses (Coenenberg 1992, p.194 ff). Due to shorter life-cycles, more automation and marketing the prime costs have lost ground to costs on higher levels in the product hierarchy: costs have moved upwards.

Like we stated above, most costs in banks are indirectly related to products. For that reason, the assumption ABC is useful in financial institution lays at hand. This assumption must be adapted, however.

In industry the costs of primary processes — the prime costs — declined as a percentage of total costs. In banks most processes, however, are still primary. Still, traditional product costing systems are not functioning well in banks either. What is the problem in banks? The first problem financial institutions have to deal with is tracing costs to primary processes. Most employees are performing many actions with a short cycle time on many different products. Detailed time registration,

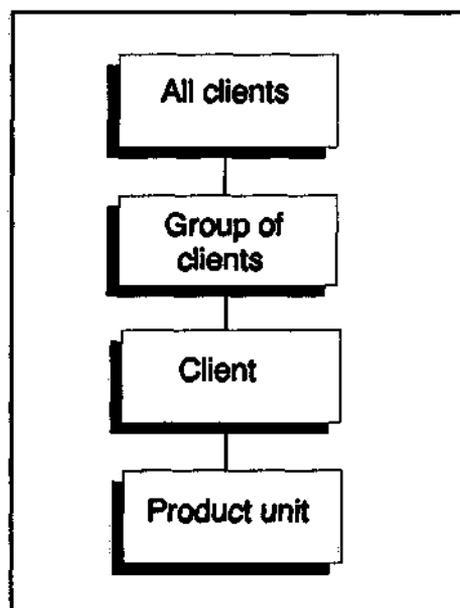


Figure 5 Client hierarchy

however, raise resistance with employees. A second problem is the shift from relatively standard processes to more non-standard ones. The product costing systems typically allocate costs on basis of standard time needed to perform an activity. A standard time for a performing a process is typically determined only for standard processes, like the opening of an account.

The time spent on these standard processes has been diminished due to automation (ATM, electronic banking) and different marketing channels (direct mail). The automation of standard activities has resulted in an increase in relatively non-standard activities like account management, advising, providing information and solving customer complaints.

The origin of the problems concerning the allocation of indirect costs differs in both industry and financial institutions.

Of a little different nature is the concept stressed by ABC, that one process may lead to action in more than one department or profit center within a business (Weiss and Hortung 1991, p.397; Götze and Meyershoff 1993, p.67).¹² As an example, the opening of an account will lead to actions in both the front and back office. All costs with a direct relation to this process can be defined as direct cost of this product unit. The authors have experience with a bank where only costs that occurred in the front office are considered direct costs.

Although it is useful to consider the complete process, it must be stated that the actions making up the process, may have different cost drivers. Taking the action advising as an part of the process 'opening an account', we notice that the number of advises normally outnumbers the number of accounts opened. To understand cost behavior it is necessary to define a special cost driver for this actions.

Compared to the traditional full costing, ABC introduced a lot of new cost drivers. Many of those (number of parts, number of set-up) bear little relevance to a banking environment, however.

Summarizing it is clear that because of the high percentage of indirect cost and the difficulties associated with measuring process time, calculating product costs is extremely difficult in a bank. Traditional product costing systems are irrelevant since their allocation bases are outdated.

6. Management control

For planning and control purposes, knowledge of cost behavior is important. Traditionally, the distinction between fixed and variable costs plays an important role. This distinction lays on the basis of flexible budgeting. As mentioned earlier, the percentage of variable costs in banks is low. For that reason the relevance of tradition planning and control methods like flexible budgeting is

¹² Götze and Meyershoff (1993, p.67): "Durch die kostenstellenübergreifende Zusammenfassung von mehreren sachlich zusammenhängenden (Teil-)Prozessen entstehen sog. Hauptprozesse, die die Grundlage der prozeßorientierten Kalkulation darstellen."

limited.

When Johnson and Kaplan (1987) presented the basics of ABC they suggested that ABC is not fit for the purpose of process control. ABC has a long term perspective: all costs are considered as variable. For short term planning and control, a distinction can *and must* be made between fixed and variable costs. It is the more remarkable that Activity Based Management, which was based on the ABC-concept, includes budgeting (Rousseau and Kocher 1993) It is very complicated to distill from a variance analysis on the basis of ABM which costs can be realised within a certain time frame. In Germany cost accounting methods like the 'Mehrstufige Fixkostendeckungsbeitragsrechnung' (Aghte 1957) and the 'Relative Einzelkosten' method are considered to be better suited for this task.

Riebel (1972) developed the 'Relative Einzelkosten' method especially for planning and control. This method has received little attention outside Germany. For planning and control Riebel claims that only *Einzelkosten*¹³, a special blend of direct and variable costs, should be assigned to calculation objects. Costs must be registered by the calculation object where they are 'Einzelkosten'. Here the costs can be influenced. Under no circumstances be allocated to lower levels in the hierarchy, in order to keep cost structure transparent (Krewerth 1981, p.15). The 'Einzelkosten' of a calculation object are defined as being those costs that are caused by the same decision that causes the existence of the calculation object. All costs that can not be considered Einzelkosten in respect to a calculation object, are defined as *Gemeinkosten*.

Riebel gives two questions to check whether costs are Einzelkosten of a calculation object:

1. Which costs disappear when the calculation object would disappear?
2. Is a change in the costs and the calculation object based on the same decision?

In his original work Riebel does not consider the labor costs of opening an account as Einzelkosten. As stated before: the total costs of the bank do not change due to an extra opening, except for some costs like paper, etc. Riebel also restrains from proportioning fixed costs, which he considers a special kind of 'Gemeinkosten'.

Below some of Riebel's (1972, p.14 ff) basic rules are listed:

1. As far as control of costs of a calculation object is concerned, only 'Einzelkosten' are relevant that are directly and additionally caused by the calculation object.
2. In a responsibility center only those costs can be controlled, that are Einzelkosten for that responsibility center and that can also be controlled by the responsibility center.
3. For planning and control of the costs of responsibility centers, the controllability of costs is a necessary but not a sufficient requirement. The cost must not only be controllable, but also be measured at the responsibility center level. When electricity costs are measured for the organization in general but not for an single responsibility center, its manager can not be held responsible. This holds even when electricity costs make up a large part of total costs (Riebel

¹³ Riebel (1972, p.343): "Kosten, die einem sachlich und zeitlich genau abzugrenzenden - Kalkulationsobjekt eindeutig zurechenbar sind; d.h. ihre Existenz wird durch dieselbe Entscheidung für eine bestimmte Maßnahme ausgelöst, wie die des Kalkulationsobjektes selbst."

1972, p.15; Johnson and Kaplan 1987, p.232).

With the exception of interest revenues, fees and the costs of paper of contracts, etc., the percentage of 'Einzelkosten' on the lower levels of the hierarchies is low. When applied strictly, 'Einzelkosten' can only be determined at the level of departments or responsibility centers. It is, for example, easily possible to determine the labor costs of the responsibility center responsible for business clients. With the decision to institute this responsibility center, the employment of people and a manager is a logical consequence, which makes these costs Einzelkosten.

To get a grasp of (long-term) cost behavior, however, knowledge of the processes performed by these employees is necessary. Riebel's 'Relative Einzelkosten' method must be adapted accordingly and be complemented by a process orientation like we showed in figure 4.

Conclusions

Part II of this paper concerned the matched opportunity rate (MOR) method of funds transfer pricing. It was argued that traditional funds transfer pricing methods lead to misleading information for pricing decisions and profitability measurement. Therefore, the matched opportunity rate method has been introduced. This method assumes that every customer transaction contributes to bank income and therefore should be recognized as an independent source of income. Further, this method uses the opportunity principle to determine the customer contribution.

In addition to the basic model of the MOR-method, the present value approach was described. This approach overcomes the limitations of the basic model. The present value approach determines the customer contribution as the excess value over a cashflow congruent market transaction at the date of origination.

Finally, some data concerning the use of the MOR-method in practice was reported.

In Part III of this paper, attention was paid to operational costs. Due to cost structure and cost behavior in financial institutions, traditional cost accounting methods for product costing and planning and control are irrelevant in a banking environment. As a consequence of the high share of (short-term) fixed costs, variable costing does not provide relevant information. The high share of indirect costs with respect to the product unit level, product costing is difficult. Further it was made clear that the typical reasons for introducing ABC in industrial business, differ from those in banks. A main problem of product costing in banks is the declining percentage of standardized primary processes.

To keep cost structure transparent it was suggested to assign costs to the calculation object to which costs are directly related first. The calculation objects can be structured in different hierarchies, depending on the calculation (product, client, responsibility center). To understand cost behavior processes and cost drivers were introduced. An accounting system was constructed on the basis of which cost accounting systems for different purposes, like the one presented by Johnson and Kaplan, can be developed.

Appendix 1 Zerobond discount factors

The value of a market transaction based on congruence in amount and timing of cashflows can easily be calculated using the zerobond discount factors (ZB-factors). A zerobond is a transaction that generates a cashflow on t_0 and a reverse cashflow on the maturity date t_n . A zerobond does not have intermediate cashflows, the income is caused by the (realizations of the) discount at which the zerobond is traded. The zerobond discount factor is the factor a future sum of money must be multiplied with to match with a current value.

With the zerobond factors a cashflow congruent market transaction can be constructed by multiplying the cashflows with the appropriate zerobond discount factor. The (present) value of the zerobond reflects the market value of the future cashflow.

The ZB-factor of a one-year zerobond is easy to calculate. Using the one-years market rate of 5.25%, the ZB-factor is $1.0525^{-1} = 0.95011876$. Thus, a cashinflow of \$ 1 at t_1 will be generated at the market by a cashoutflow of \$ 0.95011876 at t_0 .

The ZB-factor of a two-year zerobond is a little bit more difficult to calculate. To receive a cashinflow at t_2 of 1, the one has to lend at t_0 $1 * 1.0575^{-1} = 0.94562648$. This transaction will generate interest payments at t_1 of $0.0575 * 0.94562648 = 0.05437352$. This interest cashinflow should be eliminated by borrowing at t_0 a one-year zerobond of $0.05437352 * 0.95011876 = 0.05166130$. The two-year one-dollar zerobond has a value at t_0 of $0.94562648 - 0.05166130 =$ \$ 0.89396517.

t_0	t_1	t_2
-0.94562648	0.05437352	1
0.05166130	-0.05437352	
-0.89396517		

The ZB-factor of a three-year zerobond is calculated in the same way. To receive a cashinflow at t_3 of 1, the bank has to lend at t_0 $1 * 1.061^{-1} = 0.94250707$. This transaction will generate interest payments at t_1 and t_2 of $0.061 * 0.94250707 = 0.05749293$. These payments have to be eliminated by a reverse transaction at t_0 , namely a borrowing a one-year and a two-year zerobond. These zerobonds can easily be estimated with the zerobond discount factors already calculated: $0.05749293 * 0.95011876 = 0.05462511$, and $0.05749293 * 0.89396517 = 0.05139668$. The three-year one-dollar zerobond has a value of $0.94250707 - 0.05462511 - 0.05139668 =$ \$ 0.83648528.

t_0	t_1	t_2	t_3
-0.94250707	0.05749293	0.05749293	1
0.05462511		-0.05749293	
0.05139668	-0.05749293		
-0.83648528			

References

- Agthe, K.: Zur stufenweisen Fixkostendeckung, *Zeitschrift für Betriebswirtschaft*, 1959, pp. 404-418
- Anthony, R.N., J. Dearden and V. Govindarajan: *Management Control Systems*, 7th ed., Irwin, Homewood Ill., 1992
- Banken, R.: *Die Marktzinsmethode als Instrument der pretialen Lenkung in Kreditinstituten*, Schriftenreihe des Instituts für Kreditwesen der Westfälischen Wilhelms-Universität Münster, Band 35, Fritz Knapp Verlag, Frankfurt am Main, 1987
- ✓ Bos, J.J. and A. Bruggink: Kostencalculatie bij banken (I and II), *Bank- en Effectenbedrijf*, december 1993, januari 1994
- Bruggink, A.: *Prestatiemeting en prestatiebeheersing — Achtergronden en technieken*, NIBE, Amsterdam, 1992
- Bruggink, A.: *Performance Control in Banking — theory and application*, NIBE, Amsterdam, 1989
- Bruggink, A.: Performance control in bancaire organisaties (I and II), *Bank- en Effectenbedrijf*, juni 1990, pp.15-17 and juli/augustus 1990, pp. 44-49
- Chisholm, R.W. and G.K. Duncan: A product profitability system, *The World of Banking*, January-Februari 1985, pp. 27-33
- Coenberg, A.G.: *Kostenrechnung und Kostenanalyse*, 2nd ed., Verlag Moderne Industrie, Landsberg am Lech, 1993
- Fitz, C.G.: Design Framework for a Bank Profitability Management System (Part III), *Journal of Bank Cost & Management Accounting*, 1988, vol 1 no 6, pp. 74-93
- Götze, H. and J.C. Meyershoff: Die Prozeßkostenrechnung: Stand- und Entwicklungstendenzen, *Zeitschrift für Planung*, 1993/1, pp 65-96
- Haskins & Sells: *Bank Costs for Planning and Control*, Bank Administration Institute, Park Ridge, Illinois, 1972
- Horngren, C.T. and G. Foster: *Cost Accounting: a managerial emphasis*, 7th ed., Prentice-Hall, Englewood Cliffs, New Jersey, 1991
- Johnson, H.T. and R.S. Kaplan: *Relevance Lost: The Rise and Fall of Management Accounting*, Harvard Business School Press, Boston, Massachusetts, 1987
- Kaplan, R.S.: One cost system isn't enough, *Harvard Business Review*, January-February 1988
- Kaplan, R.S.: The four-stage model of cost systems design, *Management Accounting (USA)*, February 1990, pp. 22-26
- Kaplan, R.S. and A.A. Atkinson: *Advanced Management Accounting*, 2nd ed., Prentice-Hall, Englewood Cliffs, New Jersey, 1989
- Kodlin, A.: Praxis akzeptiert Marktzinsmethode, *Die Bank*, 4/92, pp. 212-215
- Krewerth, B.: *Die Kostenrechnung als Steuerungsinstrument im Bankbetrieb*, Fritz Knapp Verlag, Frankfurt am Main, 1981
- Künstel, N. and H. Schardt: Neue Entwicklungen für das Kostenmanagement, *Bank Information*, 11/92, pp. 34-39
- Marusev, A.W.: *Das Marktzinsmodell in der bankbetrieblichen Einzelgeschäftskalkulation*, Schriftenreihe des Instituts für Kreditwesen der Westfälischen Wilhelms-Universität Münster, Band 40, Fritz Knapp Verlag, Frankfurt am Main, 1990

- Riebel, P.: *Einzelkosten- und Deckungsbeitragsrechnung*, Opladen, 1972
- Rolfes, B. and X. Kramer: Erfolgsorientierte Steuerung marktbezogener Organisationseinheiten in Kreditinstituten, *Kredit und Kapital*, nr. 1, 1988, pp. 124-125
- Rousseau, P. and E. Kocher: Activity Based Management in Banking, *Banking Review*, March-April 1993, pp. 40-46
- Schierenbeck, H.: *Ertragsorientiertes Bankmanagement*, Gabler Verlag, Wiesbaden, 1st ed., 1985
- Schierenbeck, H. and B. Rolfes: *Entscheidungsorientierte Margenkalkulation*, Schriftenreihe des Instituts für Kreditwesen der Westfälischen Wilhelms-Universität Münster, Band 38, Fritz Knapp Verlag, Frankfurt am Main, 1988
- Schierenbeck, H. and A. Wiedemann (1993a): Das Treasury-Konzept der Marktzinsmethode (I): Integration von Grundmodell und Barwertkalkül, *Die Bank* 11/93, pp. 670-676
- Schierenbeck, H. and A. Wiedemann (1993b): Das Treasury-Konzept der Marktzinsmethode (II): Die Messung des Treasury-Erfolgs, *Die Bank* 12/93, pp. 731-737
- Shank, J.K. and V. Govindarajan: *Strategic Cost Analysis: The Evolution from Managerial to Strategic Accounting*, Irwin, Homewood Ill., 1989
- Tewes, J.A.: Valuing bank funds for allocation and pricing decisions, *Management Accounting (UK)*, november 1976, pp. 27-33
- Weiss, H.J. and W.G. Hortung: Stellungnahme zum Beitrag von Coenenberg und Fischer, *Die Betriebswirtschaft*, 51, 1991/3, pp.396/397