WHU-Forschungspapier Nr. 40 / November 1996

Accounting as a Credence Good: An Attempt to Throw Some Light on the Recent Loss of Relevance of German Management Accounting

Von *Barbara E. Weißenberger

Wissenschaftliche Hochschule für Unternehmensführung (WHU)
- Otto-Beisheim-Hochschule -
Burgplatz 2
56179 Vallendar/Rhein

---

* Wissenschaftliche Assistentin am Lehrstuhl für Betriebswirtschaftslehre, insbesondere Controlling und Logistik

*Abstract**

This paper is on moral hazard problems in the relationship between the management as the principal and the management accountant as his agent. We discuss these problems under two conditions: (1) that the management accountant's output is an experience good and (2) that it is a credence good. The second condition differs from the first one that even in a multiperiod relationship agency costs remain constant. This can lead to a phenomenon we will call 'organizational failure', especially if the output of the management accountant has a negative value.

We show that the internal decision support provided by a management accountant can be classified as a credence good so that organizational failure may be a reason for the recent loss of relevance of German management accounting. To resolve organizational failure we discuss the consequences and feasibility of monitoring instruments like behavioral monitoring or result monitoring. It can be shown that - in contrast to the case of experience goods - these monitoring instruments have a positive value even with risk-neutral agents.

---

* This paper is a revised version of a presentation held at the EIASM-workshop "Accounting and Economics" in Zürich on September 19-20, 1996 and is based on results of my dissertation "Zur institutionalen Koordination der Informationsbeziehung zwischen Management und Rechnungswesen", WHU, 1996. I am very much indebted to Jürgen Weber, Peter-J. Jost, Dieter Pfaff and Alfred Wagenhofer for helpful suggestions on the dissertation and to the participants of the EIASM-workshop, especially Tim Baldenius and Dieter Ordelheide, for their comments during the discussion.

1. Introduction

Financial and management accounting in German companies are traditionally incorporated as separate information systems with only few loose connections. The reason for this is based on the traditional background of German financial accounting legislature as well as on management needs.

Financial accounting is primarily directed towards external users, like shareholders, creditors, or tax-receiving bodies. Besides giving information on a company's economic position, financial accounting reports the annual net profit on which dividends as well as tax payments are based. As financial statements form the authoritative base for tax computation, companies usually try to present financial data so as to minimize tax payments. Additionally, creditor protection, as a central principle of German accounting legislature, has a great influence on the presentation of financial data: companies are encouraged to establish secret reserves to ensure long time steadiness of profit reporting.

Consequently, financial accounting systems have long been viewed as unsuitable provider of informational support for internal management decisions. Separate management accounting systems were therefore established to provide the necessary short term decision support. Although these systems basically use input data from financial accounting, many changes are made, for example from cash-based costs and revenues into imputed costs and revenues. German management is thus faced with two different types of accounting systems (Busse von Colbe, 1996), which are more than often incompatible with each other. This incompatibility is enhanced by the fact that financial accounting and management accounting are established in dual accounting concepts so that accounts can be closed individually in both systems. Thus, reconciliation becomes more difficult and are often neglected.

For many years, internal decision support has been claimed as the central objective of management accounting. In reaction to increasing complexity and dynamics of the managerial environment more and more refined and extensive ma-

nagement accounting systems were developed which were to support any kind of short term decision.

In recent times, however, a counter-movement has been started. Almost ten years after Johnson and Kaplan (1987) the question of "relevance lost" is again being discussed (Pfaff, 1994; Ziegler, 1994; BFuP-Meinungsspiegel (1995); Coenenberg, 1995; Schildbach and Wagner,1995). Empirical research shows the presence of doubts on existing management accounting systems, especially in terms of their quality and suitability as decision support (Witt, 1988; Horváth, 1992; Reiß and Höge, 1995; Weber, 1996). In 1993, Siemens, as one of Germany's biggest companies, openly decided to abandon management accounting and use their financial accounting system not only as an external information device, but as a provider of management decision support as well (Ziegler, 1994).

This development somewhat contrasts the accounting theory. From an information economics perspective it can be shown that management accounting may provide a more valuable decision support than financial accounting because management accounting systems can be adapted to the individual characteristics of a particular decision maker and/or a particular decision problem[1].

This paper attempts to throw some light on this development. The fundamental notion is that management accounting systems giving decision-facilitating information are credence goods, which will be explained in section 2. In this case, management cannot observe the value of decision support provided by a particular management accounting system.

To discuss problems arising from accounting as a credence good we propose a formal model to evaluate management accounting systems in section 3. These systems can be interpreted as message services on the appropriate method of valuation in a given decision problem. We show that they can either have a positive or a negative value.

In section 4 we use these results to formally describe an agency relationship between management and the management accountant. A moral hazard problem arises if the management cannot observe the accountant's chosen level

of effort which determines to some extent the value of his output, i.e., a particular accounting system. As this value is usually a credence good, the moral hazard problem remains even in a multiperiod relationship. This can lead to rejection of the accountant's output. The abandonment of management accounting in Germany can be explained as such a rejection.

This is a new aspect in management accounting theory which usually focuses on rather technical aspects, like the development of new, for example process-oriented, accounting techniques. Nevertheless, some papers discuss related problems. Demski and Sappington (1987) analyze how to motivate an agent to gather information before choosing an action. This differs from our model where the accountant gathers information as well but leaves the choice of action to the management. Conroy and Hughes (1987) propose a model quite similar to ours but in contrast they take the agent's output as contractable and hence an experience good.

In section 5 we take a normative perspective and analyze two types of monitoring instruments that can be used to alleviate the organizational failure in the case of credence goods: behavioral monitoring and result monitoring. Section 6 finally contains some conclusions and prospects for future research.

2. *Experience and credence goods*

The ability of the user to evaluate goods: search goods, experience goods and credence goods

Search goods, experience goods and credence goods as goods categories are based on the works of Nelson (1970) and Darby/Karni (1973). They are defined according to the user's ability to determine the value of a good. Search goods are those whose value can be determined before use by simple inspection at negligible cost. An example for such a good would be a rug, whose design can be determined before purchase. The value of experience goods, for example an article of food, can be determined only after use: important qualities like taste will be known only after eating. Credence goods cannot be evaluated at all or only at prohibitively high costs: cloth which is claimed to be made of eco-cot-

ton and has not been treated chemically is a credence good. It is important to note that these categories depend on the knowledge and the judgmental power of the user. A good that would be considered as an experience good by one person may be a credence (or search) good for another.

Nelson (1970) distinguished only between search and experience goods. He explained market structure as a function of consumers' search strategies, i.e., inspection or trial. Darby/Karni (1973) introduced credence goods and discussed the possible loss of economic welfare in comparison to search goods and experience goods if they are offered by fraudulent sellers. An attempt to integrate all three categories of goods into one model was first made by Zeithaml (1981): she developed a services marketing concept and used all three types of goods to cluster tangible goods and services on a continuum of increasing inability to evaluate quality.

Analysis of contractual relations: experience goods versus credence goods from a new perspective

The possibility of reacting upon another party's strategic behavior plays an central role in the analysis of contractual relations. Macneil (1974: 693) describes contractual relations as a "promise or set of promises" between economic parties to exchange goods or services. Any utility-maximizing party tries not to give away more in value than the other party offers. This remains easy if the value of the offer is known ex ante or, using our terms, a search good. If the value of the offer is lower than the price that has to be paid, any utility-maximizing party can react by rejecting the contract.

If the value of the offer is not known ex ante, but will be known ex post, the offer will be accepted if contractual conditions concerning its value, like conditional payments or guarantees, can be agreed upon. These contractual conditions are secondary means of reacting upon an offer of insufficient value. The use of such contractual conditions requires the possibility of claiming recourse, otherwise they are ineffective[2].

If the offer of the other party is a credence good, there is never a possibility to claim recourse; no condition can be linked to the good's value because the va-

lue will never be observed at all. The three categories of search, experience and credence goods can therefore be reduced to experience goods and credence goods in a broad sense (see Figure 1)[3].

	reaction upon insufficient value	
	possible	**impossible**
transaction without recourse	search goods	experience goods credence goods
transaction with recourse	search goods experience goods	credence goods
	experience goods in a broad sense	**credence goods in a broad sense**

Figure 1: A broader definition of experience and credence goods

If a party is able to observe the value of an offer in a contractual relationship so that recourse can be claimed, we will henceforth call this offer an experience good. If a party is not able to claim recourse concerning the value of an offer, we will henceforth call the offer a credence good.

Accounting systems as transaction objects: experience or credence goods?

Before studying closely the accounting systems provided by a management accountant, we have to discuss whether these systems are experience goods or credence goods.

An accounting system can be interpreted as a message service on the appropriate method of valuation in the decision making process. Information economics usually assumes that a message service provided by an expert, for example a management accountant, does not convey less information than the decision maker already possesses, so that it can at least do no harm. This is what Marschak (1954: 201) had in mind when he pointed out that "there is no damage in knowledge".

Unfortunately, a decision maker cannot always be sure that the agent providing a message service is really a good expert, or, more formally, if the message service in fact does convey additional information. Whereas a message service

from a good expert helps to increase expected utility, using a message service from a bad expert may result in decreasing expected utility[4].

If we assume a multiperiod relationship between the decision maker and expert[5], which implies the possibility of recourse, we can identify two conditions, one of which must be satisfied in order for a message service to be classified as an experience good:

(1) *The decision maker can identify the action, which would have been optimal, ex post.*

If, for example, an investment counsellor proposes an investment that, ex post, yields a result below market average, the chances are higher that he is a bad expert. If the yield is better than the market average, he is probably a good expert. The same would hold for the advice of a meteorologist.

(2) *The decision maker has already accumulated a lot of knowledge, so that the remaining risk is relatively low.*

If, for example, the decision maker is an investment counsellor himself, he should be able to judge the advice provided by a second investment counsellor, e.g. through plausibility or methodological checks, and thus find out, before using it in his decision, whether the counsellor is in this case a good or a bad expert.

If none of these conditions hold, then the message service provided by the expert is a credence good: the decision maker is not able to determine its value neither before nor after taking the decision.

An important question is now, whether an accounting system as a message service is an experience good or a credence good. Upon closer examination the first condition is unlikely to be met: The management accountant, as the expert, provides decision support for a great number of decisions, but the resulting profit is usually calculated in an overall perspective and so cannot be attributed to particular decision problems. Additionally, the profit of unrealized alternatives is usually not accurately known.

The second condition mentioned above may hold in some cases: if a member of management has previously accumulated a large amount of knowledge on different accounting systems, he should be capable of evaluating a message service provided by the management accountant. But the more complex the managerial environment and, as a result, management accounting systems, the less likely this condition is met. It seems plausible therefore to put forward the hypothesis that management accounting systems are credence goods.

3. *Evaluating the accounting system provided by the management accountant: a formal approach*

Before describning the agency relationship between management and management accountant we first have to examine more closely the value of the message service - or accounting system - which is the agent's output. Not only are the driving forces determining this value of special interest, but also the question, whether the value of the message service may be negative, thus causing even without costs disutility to the principal.

The formal approach to evaluating an accounting system as decision support to indicate the appropriate method of valuation is based on Marschak's (1954) model for calculating the value of an inquiry.We assume a manager M has to choose from a given set A=$\{a\}$ of alternative actions a. M's Neumann-Morgenstern utility function U depends on the short term monetary profit g_a realized with the chosen action a. This implies that any additional conflicts between management and owners are neutralized in this paper, e.g. by assuming that goal conflicts have been eliminated by the necessary contractual mechanisms, to put a clearer focus on the internal relationship between management and management accountant.

The decision is made under uncertainty because g_a is a function of a given set S=$\{s\}$ of states of Nature s. M attributes to each s a subjective probability p(s)[6]. As a rational decision maker he chooses the action a that maximizes his expected utility

$$\max_a \mathrm{E}\left[\mathrm{U}(g_a)\right] = \max_a \sum_s \mathrm{p}(s)\,\mathrm{U}(g_{as}) \qquad (1)$$

This choice can be improved if M acquires additional information on the probabilities p(s). To analyze the role the management accountant plays as an expert, we must have a closer look at the states of nature. The uncertainty expressed by p(s) can be attributed to two different sources:

* *Uncertainty about exogenous future events*:
  This is a common interpretation of uncertainty. Changes in managerial environment, e.g. production technologies, cannot always be foreseen. Information about some exogenous future event z is provided e.g. by production management.
* *Uncertainty about the appropriate method of valuation with which to calculate profits*:
  This is a second source of uncertainty, not as commonly discussed as the first. To attribute operating profits g to each alternative action a for each possible event z, M has to know how to evaluate the substantial consequences of each a, i.e., translate these consequences into costs and revenues. As there are many different methods of valuation[7] that can attribute profits to alternative actions M needs to know which method is best used in some particular circumstance. This is not only a question of objective data quality, but also of subjective adaptation of cash-based costs and revenues e.g. to individual risk-preference. The information on the appropriate method of valuation is to be provided by management accounting systems.

This distinction has important implications: uncertainty can only be reduced by a management accountant on the choice of methods of valuation m, but not on future events z. Even if he provided perfect information on m, a decision under uncertainty could still remain with respect to unknown z. In this case the optimal method of valuation $\underline{m}$ should attribute expected utilities to each alternative action that reflect as well as possible the remaining uncertainty on exogenous future events z.

Formalizing these ideas we assume a given set $Z=\{z\}$ of future events z, and a given set $\Omega=\{m\}$ of possible accounting systems m for calculating operating

profits g. Both Z and Ω are assumed to be stochastically independant. This implies that, among other things, behavioral aspects, like influencing z by some choice of m, are excluded from our analysis.

p(s) can now be interpreted as

$$\mathrm{p}(s) = \mathrm{p}(z)\,\mathrm{p}(m) \tag{2}$$

p(z) is the subjective probability M attributes to some exogenously given future event z and p(m) is the subjective probability that an accounting system m should be used to calculate the expected utilities for a particular decision problem.

The management accountant's output has to be measured in how far the accounting systems help to reduce (or increase) this methodological kind of uncertainty. The expected utility rule (1) now becomes[8]

$$\max_{a} \sum_{m} \mathrm{p}(m) \sum_{z} \mathrm{p}(z)\,\mathrm{U}(g_{amz}) \tag{3}$$

For simplification we will introduce the preference value P_{am}, which comprises the expected utility of an action calculated with a method of valuation m:

$$P_{am} = \sum_{z} \mathrm{p}(z)\,\mathrm{U}(g_{amz}) \tag{4}$$

Expression (3) can then be written as

$$\max_{a} \sum_{m} \mathrm{p}(m) P_{am} = \max_{a} \mathrm{E}[P_a] \tag{5}$$

Expression (5) implies that a rational decision maker M maximizes his expected utility if he chooses the action a with the maximum expected preference value. The expectancy is expressed by the probabilities p(m) that are attributed to the different accounting systems m. If, by chance, the best method of valuation $\underline{m}$ is perfectly known, then M will attribute to every alternative only one preference value $P_{a\underline{m}}$=E[P_a] and choose the action $\hat{a}$ with $P_{\hat{a}\underline{m}} \geq P_{a\underline{m}}$ for all $a \neq \hat{a}$.

Example:

A customer asks for a modified version of a standard product. It is a one-time special order and he is ready to pay a premium of up to 10% on the price of the standard product. M, e.g. the sales manager, has to decide whether to accept this order. The production manager informs him that

there is enough idle production capacity to accept this order. Nevertheless M is not sure, how much additional input in production, as well in administration, will be needed to implement the modifications.
Attributing profits to both alternatives he is uncertain if he should calculate with full costs or differential costs. Figure 2 summarizes the decision matrix faced by M.

			z=1 low input	z=2 high input	P_{am}	$E[P_a]$
			p(z=1)=0.7	p(z=2)=0.3		
a=1 accept order	**m=1** differential costs	p(m=1)=0.6	+30	-20	+15	+5.4
	m=2 full costs	p(m=2)=0.4	0	-30	-9	
a=2 decline order			+10	+10	+10	+10

Figure 2: Decision matrix (example) with uncertainty about future events and about accounting systems

The columns describe uncertainty on future events, e.g. the additional input it will take to implement the modification. It can either be low (with the probability p(z=1)=0.7) or high (with the probability p(z=2)=0.3). Additionally, M is not sure whether to calculate this special order at full costs or differential costs. With p(m=1)=0.6 he assumes that the best method of valuation will be calculating with differential costs. Consequently, he considers a calculation using full costs as best method of valuation only with p(m=2)=0.4.
To calculate $P_{a=1}$ or expected utility of the action a=1 (accept order), M has to weigh the possible profits not only with the probabilities of future events (low versus high input), but also with the probabilities of the possible accounting systems (differential costs versus full costs). It is +5.4 for the first alternative (accept order) and +10 for the second al-

ternative (decline order). As a rational decision maker, M will now decline the order.

Accounting theory says that the best method of valuation is calculation using differential costs (Deakin and Maher, 1994: 445-7). From this point of view, M makes a wrong decision. If M knew accounting theory well enough, then his subjective probability p(m=1) would change to 1.0, and p(m=2) consequently to 0. In this case, the expected utility of the first alternative rises to +15. M would now accept the special order and so, in the light of risks only related to exogenous future events that cannot be foreseen, make a better decision. Consequently, a message service conveying information on the choice of methods of valuation by improving the subjective probabilities p(m) would be valuable to M. On the other hand, a message service worsening the p(m), for example by changing them from p(m=1)=1.0 to 0.5 and p(m=2)=0 to 0.5, should be rejected by M.[9]

To evaluate a management accounting system, we will assume that M already has gathered all available information in order to reduce uncertainty related to future events: the p(z) can no longer be improved. We will now have a closer look at the p(m).

At the starting point of our analysis, i.e., when M is first confronted with a particular decision problem, all possible methods of valuation have equal probabilities p(m) according to the Laplace rule. If M has some knowledge on the choice of methods of valuation, this knowledge can be interpreted as message service η', sending without cost and delay some signal $i' \in \eta'$ that changes the prior probabilities p(m) in a Bayesian process into posterior probabilities p($m|i'$). The p(m=1)=0.6 and p(m=2)=0.4 from the above example can be interpreted as such posterior probabilities.

If η' as a message service gives perfect information on the choice of accounting systems for a particular decision problem, then $i' \in \eta'$ will be such that the best method of valuation $\underline{m}$ will have the posterior probability p($m=\underline{m}|i'$)=1.0. All other posterior probabilities will be p($m \neq \underline{m}|i'$)=0. We can assume however that,

in most cases, η' gives only imperfect information because otherwise the management accounting profession would probably not exist.

M now has the possibility of acquiring an accounting system as a message service to reduce uncertainty on the choice of the appropriate method of valuation from a management accountant R. This message service is provided, for example, through a report R submits on a particular decision problem and will be denoted η. Any signal $i \in \eta$ changes the probabilities $p(m|i')$ in a second Bayesian process to new posterior probabilities $p(m|i',i)$. Both η' and η represent aggregated knowledge on the choice of methods of valuation. As M - who possesses η' - and R - who possesses η - are different persons, both message services are unrelated. Figure 3 summarizes the series of events during the decision making process.

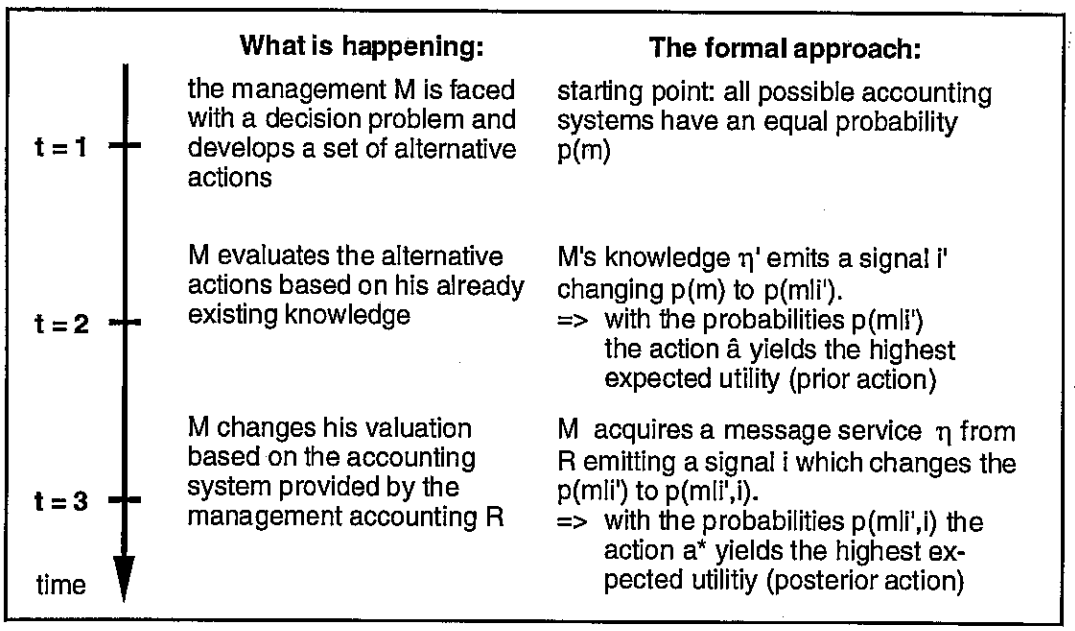

Figure 3: Series of events during the decision making process

The value of any message service depends on how the choice of action changes after a signal has been emitted. We denote the optimal action chosen by M, based only on the message service η', with $\hat{a}$, the optimal action based on information from η being denoted by a^*:

$$\hat{a} = \max_a \sum_m p(m|i')\,P_{am} = \max_a E[P_a|i'] \qquad (6)$$

$$a^* = \max_a \sum_m p(m|i',i)\,P_{am} = \max_a E[P_a|i',i] \qquad (7)$$

We are now confronted with two message services η' and η influencing the choice of the method of valuation. η' is *always* used by M because as his knowledge it is assumed to be available without costs or delay. The use of η which is provided by R is voluntary and depends on its value *in comparison to* η'. It is evident that the value of η can only be positive if η is a better message service on a particular decision problem than η'. Consequently, both message services η and η' have to be put into an order.

Unfortunately, a general ranking of two message services - or information systems - is only possible if Blackwell's (1953) theorem holds, which is not always the case. Blackwell's theorem shows that the message service with the lower rank is just a stochastic transformation (garbling) of the message service with the higher rank: The former contains just imperfect information about the latter[10].

Nevertheless, a ranking is always possible with reference to a particular decision problem. As Laffont (1989: 58) points out, a message service η has a higher rank than a message service η' if, for a given decision problem and a given Neumann-Morgenstern utility function U, condition (8) holds:

$$\mathrm{E}[U|\eta] > \mathrm{E}[U|\eta'] \qquad (8)$$

Expression (8) implies that the decision maker reaches a higher expected utility by using message service η than by using the message service η'. This rather individually-oriented concept will now be used to evaluate η. Let D be the value of a message service η provided by R. According to (8) we then have to distinguish two cases:

Case 1: η is equal to or better than η' (or $\eta \geq \eta'$):

In this case D can be calculated according to (9) which corresponds to Marschak's (1954) decision oriented valuation of informative signals[11]:

$$D = \sum_i \mathrm{p}(i)\left(\mathrm{E}[P_{a^*}|i',i]\right) - \mathrm{E}[P_{\hat{a}}|i'] = \sum_i \mathrm{p}(i)\left(\mathrm{E}[P_{a^*}|i',i] - \mathrm{E}[P_{\hat{a}}|i',i]\right) \geq 0 \qquad (9)$$

It is evident in expression (9) that D is the aggregated increase of expected utility which is expressed by the expected posterior preference values $\mathrm{E}[P_{a^*}|i',i]$. These are calculated with the posterior probabilities

$p(m|i',i)$, which implies the input of the better message service η and are weighted with the individual probabilities $p(i)$ of each signal $i \in \eta$.

(9) shows as well that D has to be non-negative: For every signal $i \in \eta$, either an action $a^* \neq \hat{a}$ will reach a higher expected preference value so that $E[P_{a^*}|i',i] > E[P_{\hat{a}}|i',i]$, or $\hat{a}$ remains the optimal action with $E[P_{\hat{a}}|i',i] \geq E[P_{a \neq \hat{a}}|i',i]$. In both cases the difference is non-negative. As $p(i)$ are non-negative probabilities, D itself can never become negative in this case.

Case 2: η is worse than η' (or $\eta < \eta'$):

In this case we have to modify the calculation of D to[12]

$$D = \sum_i p(i)\left(E\left[P_{a^*}|i'\right]\right) - E\left[P_{\hat{a}}|i'\right] = \sum_i p(i)\left(E\left[P_{a^*}|i'\right] - E\left[P_{\hat{a}}|i'\right]\right) < 0 \quad (10)$$

In contrast to the former case D is now the aggregated decrease of expected utility because a worse message service η induces a worse choice of action. The expected preference values $E[P_{a^*}|i']$ after choosing the posterior alternative a^* must now be calculated with the prior probabilities $p(m|i')$ because this time these probabilities reflect the better message service η'. Thus, the changes in the choice of action are included only implicitly through the identification of an alternative a^* that would have been optimal if a signal $i \in \eta$ had been used.

As always $E[P_{a^*}|i'] \leq E[P_{\hat{a}}|i']$ - because otherwise $\hat{a}$ would not be the optimal action prior to using $i \in \eta$ - and $E[P_{a^*}|i'] < E[P_{\hat{a}}|i']$ for at least one i with $w(i) > 0$, (10) shows that D must be negative.

D, as the value of η, is M's gain or loss in expected utility if M uses R's message service η as accounting system in his decision-making. If R is a good expert ($\eta \geq \eta'$), then M gains because he is more likely to calculate the profits of the alternative actions with the best method of valuation and thus choose a better action than without using η. If R is a bad expert, then M might change from a good to a worse action by choosing a method of valuation with the help of a bad message service[13].

Equations (9) and (10) have some additional implications summarized by Figure 4 (Weißenberger, 1996: 111-26):

* If M has perfect information on the choice of methods of valuation, i.e., knows the method $\underline{m}$, then $D \leq 0$: if η also contains perfect information, then $D=0$, otherwise $D<0$.
* If M has no information at all, then $D \geq 0$: if η also contains no information, then $D=0$, and if η contains at least some information, $D>0$[14].
* If η contains perfect information, then D reaches a maximum.
* If η contains no information at all, then D reaches a minimum.

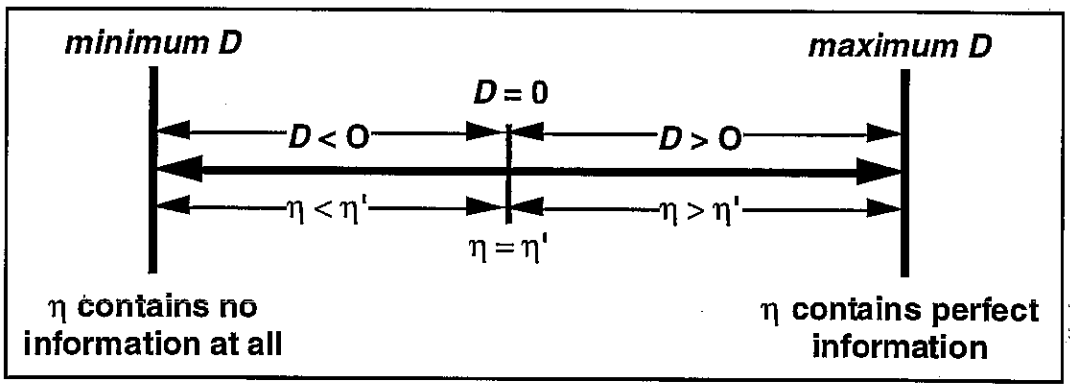

Figure 4: Value of η depending on the relationship between η and η'.

Having now formally derived that the value D of the management accountant's output η depends on the relation of its quality to the quality of management's knowledge η' and that this value may very well become negative, we can now analyze more closely the moral hazard problems that arise in the relationship between M and R.

4. *The agency relationship between management and management accountant*

From an agency perspective the management is considered as the principal, the management accountant as the agent. The management delegates valuation which is originally part of the management tasks to the management accountant. The reason behind this is the need to specialize because management tasks have become to complex to be exercised as a whole by the management himself.

Ross (1973: 134) describes agency relationships as "one of the oldest and commonest codified modes of social interaction". They arise if one party, the agent, performs on behalf of another party, the principal, a particular task, which, for some reason, the principal cannot or does not want to perform himself. The principal pays an agreed remuneration to the agent who, in return, has to transfer the outcome which results from his effort to the principal. All relevant aspects of the agency relationship form a contract that may be either real or fictitious.

The normative analysis of agency relationships has thrown some light on many phenomena, especially the moral hazard problem (Ross, 1973; Holmström, 1979; Shavell, 1979). The central contractual instrument to alleviate the moral hazard problem is conditional payments depending on the outcome of the agent's effort. This alleviation is costly if the agent is risk-averse because then a trade-off between incentive effects and optimal risk-sharing can be observed. This trade-off is called agency costs and normative agency literature concentrates on explaining or finding contractual instruments to reduce these costs.

The basic model: experience goods - the traditional results of agency theory do hold

In this part of section 4, we will study the relationship of M and R under the condition that the value D of the message service η can be observed by both M and R: η is an experience good. In this case, we will denote its value as $\underline{D}$. To assume the output of the agent's effort to be an experience good - for example, some monetary output - is quite typical for agency games described in the literature.

$\underline{D}$ depends on some action e privately taken by R and on a random state of nature θ, signifying some exogenous risk: $\underline{D}=\underline{D}(e,\theta)$. This leads to a moral hazard problem if from M's point of view another level of e is desirable than from R's point of view. We assume that $\underline{D}_e>0$, so that M prefers higher levels of e.

M's Morgenstern-Neumann utility function U is defined over $\underline{D}$. $\underline{D}$ is reduced by the remuneration B M has agreed to pay to R. For simplicity we assume that all

other costs M incurs are zero[15]. M is supposed to be risk-neutral: U=U($\underline{D}$-B) with U'>0 and U''=0.

R's Morgenstern-Neumann utility function V is defined over remuneration B and action e: V=V(e,B). This is further restricted by assuming that V(e,B)=N(B)-H(e) with N'>0 and N''<0 which implies that R is risk-averse over B and H'(e)>0 and H''(e)>0, so that R prefers lower levels of e. R is only willing to accept a contract if he can expect at least some minimum reservation utility V_{min}.

The interpretation of these assumptions is the following: M has to solve a decision-making problem. He feels that he does not possess enough accounting knowledge to enable him to calculate the right costs and revenues for alternative actions. He asks R to provide him with a message service, for example an accounting report, indicating the appropriate method of valuation. He offers R the fee B. If R accepts this offer, R has to make a productive input e to produce η.

$\underline{D}$, as the value of η, does not only depend on R's effort e, comprising all efforts R undertakes to produce an message service with a high value $\underline{D}$, but also on some random effects θ, for which R is not responsible. These effects can be mistakes in data processing, misunderstandings or just plain errors. We assume that with higher efforts e the probability of random bad effects decreases but never equals zero. e can be observed by M only jointly with θ through the observation of $\underline{D}$.

e causes disutility to R which rises progressively with increasing e. The disutility results from conflicts of interest. Many examples can be found, e.g.

* R wants to use very accurate methods of valuation that lack actuality.
* R wants to use methods of valuation which are fashionable at the time but do not conform to the decision problem.
* R does not want to put high efforts into the procurement of the necessary input data to find the best method of valuation $\underline{m}$.

One of the earliest results of agency-theory was that in contrast to the Pareto-optimal risk-sharing arrangement that proposes a fixed payment, B has to be

made dependant on the output $\underline{D}$. Otherwise, the utility-maximizing R will choose a minimum level of effort e_{min} and justify low values of $\underline{D}$ with a bad θ. The following program describes the maximization problem M faces to determine the optimal $B^*(\underline{D})$:

$$\max_{B(\underline{D})} E\left[U(\underline{D}(e,\theta)-B(\underline{D}))\right] \quad \text{subject to} \tag{11}$$

$$E\left[N(B(\underline{D}))\right]-H(e)\geq V_{min} \tag{12}$$

$$e=\arg\max_{e'\in\{e\}}\left\{E\left[N(B(\underline{D}))\right]-H(e')\right\} \tag{13}$$

Expression (11) implies the maximization of M's utility subject to R's expected utility reaching at least the reservation level V_{min} (12) and R maximizing his utility for any given contractual arrangement $B(\underline{D})$ (13)[16]. We have to keep in mind that M is, in fact, primarily interested in the level of $\underline{D}$; R's choice of e matters only secondarily as it has an influence on the level of $\underline{D}$.

A very simple procedure like the first order condition approach taken with the necessary assumptions already shows that the results of this game conform to the results of classical principal agent-theory. The first-best solution - the optimization without expression (13), which implies perfect knowledge of e and thus absence of the moral hazard problem - results in

$$\frac{U'}{N'}=\lambda \tag{14}$$

The second-best solution is

$$\frac{U'}{N'}=\lambda+\mu\frac{f'(\underline{D}|e)}{f(\underline{D}|e)} \tag{15}$$

$f(\underline{D}|e)$ denotes the density function of $\underline{D}$ depending on an effort e made by the agent and caused by random influence θ, and $f'(\underline{D}|e)$ is its first derivative. Both equations (14) and (15) show conditions for the optimal contract. The additional μ-term with $\mu>0$ in equation (15) implies the loss of expected utility for M - the agency costs - resulting from a deviation of optimal risk-sharing. Only if R was risk-neutral, would the contract be Pareto-optimal either as a risk-sharing device or as an incentive device. In this case μ equals zero.

An important condition for the existence of a contract between M and R is that at least the optimal contract $B^*(\underline{D})$ should lead to a non-negative expected uti-

lity level in (11). If this is not the case, then the agency-relationship in itself is inefficient and a rational M will not offer a contract to R. This condition is usually neglected, but plays an important role when we examine closely the case of credence goods.

As can easily be seen, many other results developed in normative agency theory hold for the relationship between M and R (Weißenberger, 1996: 162-74). For example, as Holmström (1979) showed, an additional and stochastically independent message service $C_b=\{c_b\}$ monitoring e will have a positive value only if R is risk-averse because a contractual arrangement $B(c_b,\underline{D})$ reduces the influence of θ. If R is risk-neutral, C_b has no value at all. If the costs K_{Cb} of the message service C_b are lower than the reduction of agency costs induced, it is feasible to use C_b.

Another instrument to reduce agency costs is to make use of multiperiod contracts with memory: M offers a payment scheme which is conditional not only on the actual performance $\underline{D}_t$ of the actual period t, but also on the performance of past periods $\underline{D}_{t-1}$, $\underline{D}_{t-2}$, etc. A period comprises the completion of one subgame between M and R, which, in this model, would be the production of an accounting system as a decision support for one particular problem. This implies a relationship with recourse. Lambert (1983) has shown that agency costs are reduced in a two-period game because a risk-averse agent can diversify at least some of the exogenous risk θ over the two periods.

Extending the program described above in two-period model[17] results in

$$\frac{U_1'}{N_1'} = \lambda + \mu_1 \frac{f'_1(\underline{D}_1|e_1)}{f_1(\underline{D}_1|e_1)} \tag{16}$$

as second-best solution for the first period and in

$$\frac{U_2'}{N_2'} = \lambda + \mu_1 \frac{f'_1(\underline{D}_1|e_1)}{f_1(\underline{D}_1|e_1)} + \mu_2(\underline{D}_1) \frac{f'_2(\underline{D}_2|e_2(\underline{D}_1))}{f_1(\underline{D}_1|e_1) f_2(\underline{D}_2|e_2(\underline{D}_1))} \tag{17}$$

as second-best solution for the second period. Condition (16) for the optimal contract $B_1^*(\underline{D}_1)$ in period 1 and (17) for the optimal contract $B_2^*(\underline{D}_1,\underline{D}_2)$ in period 2 show that the moral hazard problem is not resolved in any of the two periods as $\mu_1>0$ and $\mu_2>0$. But Lambert shows as well that the expected value

of the quotient of marginal utilities is in both periods equal to λ: This implies income smoothing for the agent and thus a diversification of the exogenous risk θ, which consequently leads to a reduction of agency costs.

The more future periods a contract comprises, the less exogenous risk θ the agent has to carry: consequently, agency costs should decrease with the number of periods ex ante contracted upon. Early analysis of this intuition is provided by Rubinstein (1979) and Radner (1981). Rubinstein shows that in an infinite game exogenous risk can, under certain conditions, be fully diversified, so that the principal can achieve a first-best solution[18]. Radner (1981) comes to similar results. Figure 5 indicates the decrease of agency costs as a difference between M's expected utility in the first and second-best solution.

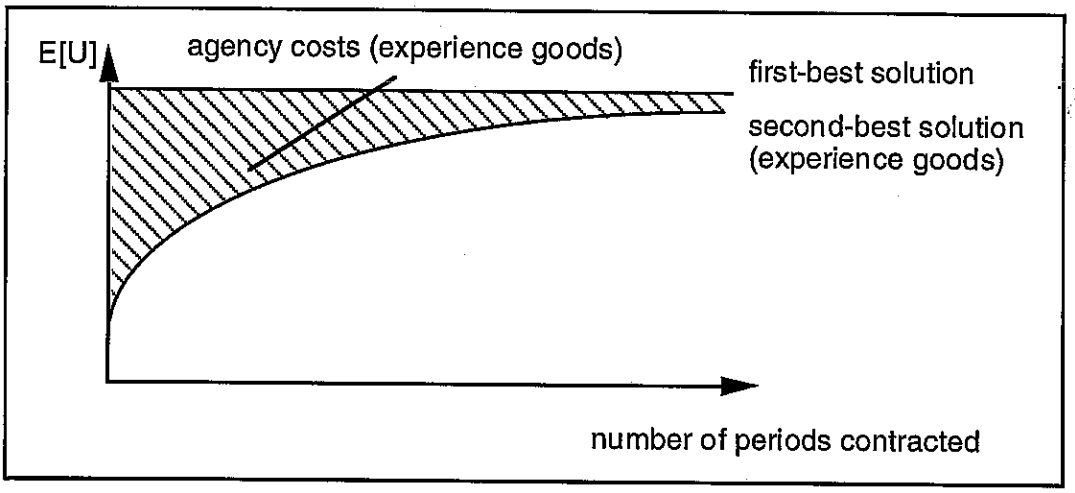

Figure 5: The decrease of agency costs in multiperiod settings (experience goods)

The higher the number of periods contracted, the lower the agency costs incurred by M in each period.

As the relationship between M and R is usually a long term relationship which implies the possibility of recourse, this result should hold for their relationship if η is an experience good. This has important implications: in this case there could be no significant moral hazard problem between management and management accountant since it should be alleviated by long term contracts. Consequently, the abandonment of German management accounting could not be explained by moral hazard problems if accounting systems were experience goods.

Another result is also evident: costly monitoring of e becomes less feasible if the number of periods ex ante contracted upon increases. In this context, $\underline{D}$ can be interpreted as a costless monitoring signal that supersedes costly behavioral monitoring in long term contracts.

A new perspective: production of credence goods in an agency relationship and organizational failure

If the output η of R's effort is a credence good, then its value, which now will be denoted by $\eth$, cannot be observed by M. As today's management accounting systems in Germany are rather complex and their understanding requires a lot of knowledge, we can assume that most management accounting systems have to be considered as credence goods: Their value - i.e. their quality as a message service denoting the appropriate method of valuation - is not known to the management.

In this situation, the 'easy way out' of the moral hazard problems is unavailable because M cannot offer a contract to R in which the payment B directly depends on the value $\eth$ of the output η itself[19].

This implies that M has to offer R a fixed payment and R will - in the case of hidden action - invariably choose the minimum level of effort e_{min}. Consequently, a utility-maximizing M will offer only a payment $B_{fix,min}$ so that R reaches with $e = e_{min}$ just his reservation utility V_{min}. This holds for a one-period relationship as well as for a multiperiod relationship.

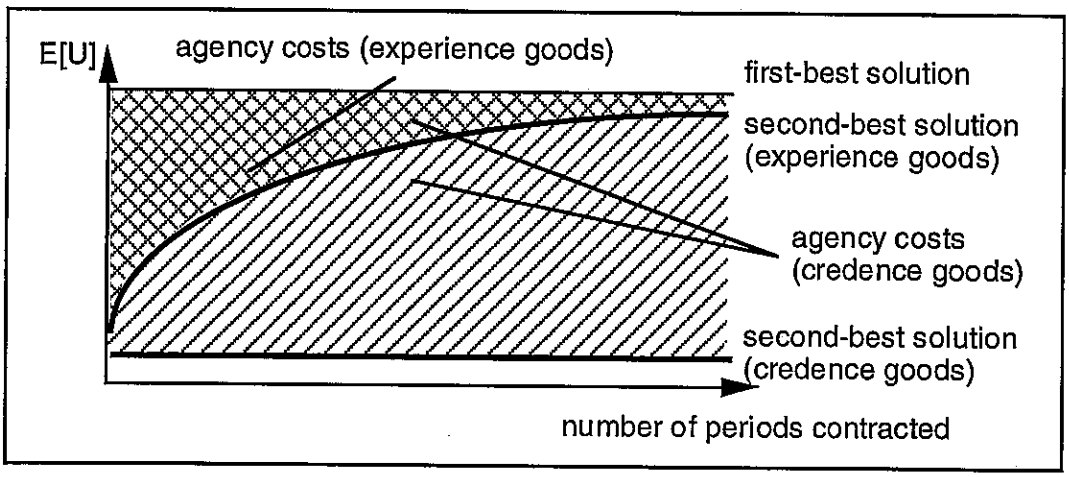

Figure 6: Constant agency-costs in multiperiod settings (credence goods)

Consequently, agency costs do not decrease in long term contracts; the expected-utility functions from Figure 5 therefore change to Figure 6[20].

The situation may arise where the level of e_{min} is so small that the expected utility M reaches will be negative. In this case, M will not offer a contract to R, but will make his decision without acquiring η. This implies that the agency costs are higher than the expected utility of the first-best solution: the second best function of the credence goods case in Figure 6 would then be found below the abscissa. If the relevant second best expected utility of the case of experience goods is above the abscissa, this situation can be interpreted as 'organizational failure'. It occurs only because R's output is a credence good[21] which results in constant agency costs. Figure 6 makes it evident that the more periods are ex ante contracted upon, the higher the probability for the existence of organizational failure becomes.

If we take as given that management accounting systems can be considered as credence goods, then, in the absence of other contractual mechanisms, a moral hazard problem can easily lead to organizational failure in management accounting. M then decides not to offer a contract to R or, in a more dynamic perspective, stops offering contracts. We can thus deduce that the recent loss of relevance of German management accounting can, at least to some extent, be explained by an unresolved moral hazard problem and, consequently, high agency costs in management accounting.

Trying to find evidence for organizational failure by taking a closer look at management accounting in Germany we nevertheless find that - even though its relevance is discussed - only very few companies have in fact stopped using management accounting systems. This leads to the question if the organizational failure of management accounting is prevalent only in few German companies. One answer could be that in these companies organizational failure occurs only in a hidden way because the decision to offer a contract to R is made by a different member of management than the person deciding to use η as decision support[22].

Comparing once again the case of credence goods to the case of experience goods (Figure 6) we find that the difference of agency costs is increasing with the number of periods contracted upon. Consequently, costly contractual instruments, that help reduce agency costs also in the case of credence goods become the more feasible, the more periods are contracted upon. In the following section we will discuss monitoring instruments as such an instrument.

5. Monitoring instruments in agency relationships: a new perspective

Having analyzed some reasons for the recent loss of relevance of German management accounting, we now take a normative perspective discussing some monitoring instruments that could help to reduce agency costs in the case of credence goods. Note that these instruments are assumed to be costly, so that they play a subordinate role or no role at all in the multiperiod case of experience goods because here $\underline{D}$ exists as costless monitoring instrument, superseding many other, costly monitoring instruments.

Monitoring costs arise from designing monitoring instruments, from getting monitoring data, from disutility that monitoring may cause with the agent or from additional moral hazard of a third-party monitor.

Monitoring instruments can be interpreted as message services as well. Their value equals the reduction of agency costs they induce. In this section we will examine two different types of monitoring instruments relevant in the case of credence goods: behavioral monitoring, giving imperfect information on e, and result monitoring, giving imperfect information on $\tilde{D}$.

Behavioral monitoring:

Behavioral monitoring can be interpreted as the acquisition of an message service $C_b=\{c_b\}$ emitting a signal $c_b \in C_b$ on R's effort. Consequently, c_b is stochastically correlated with e, but not with $\tilde{D}$. This implies for example that c_b would not vary with $\tilde{D}$ if e was kept constant. If c_b gives only imperfect information on e, a monitoring risk ψ_b exists: c_b might wrongly indicate a high (or low) level of effort. This risk is assumed to be independent of θ. We can interpret c_b as $c_b(e,\psi_b)$.

A typical example for behavioral monitoring in management accounting is process auditing, which tries to measure ratios on the information processing effort performed by the management accountant.

In order to motivate R to choose a higher level of effort than e_{min} M can make the payment B dependant on a signal $c_b \in C_b$: $B=B(c_b(e,\psi_b))$. This is very similar to a payment $B(\underline{D}(e,\theta)$ in the case of experience goods. As R is risk-averse, this payment scheme once again deviates from the Pareto-optimal risk-sharing arrangement because R has to carry control risk ψ_b as an incentive device. Expressions (18) to (20) show the new maximazation program that leads to the optimal contract $B(c_b)$:

$$\max_{B(c_b)} E\left[U\left(\tilde{D}(e,\theta)-B(c_b)\right)\right] \quad \text{subject to} \tag{18}$$

$$E\left[N\left(B(c_b)\right)\right]-H(e)\geq V_{min} \tag{19}$$

$$e=\arg\max_{e'\in\{e\}}\left\{E\left[N\left(B(c_b)\right)\right]-H(e')\right\} \tag{20}$$

Note that the expectation M forms on $\tilde{D}$ is not dependant on c_b but on the level of effort e induced by the payment scheme $B(c_b)$ through (20). Solving this program using the first order condition approach leads to the condition for the optimal payment scheme in the second-best situation (Weißenberger, 1996: 202-6):

$$\frac{E_\theta[U']}{N'}=\lambda+\mu\frac{f^{b'}(c_b|e)}{f^{b}(c_b|e)} \tag{21}$$

Comparing condition (21) to condition (15) we find that the main difference consists in M's marginal utility U' which is formulated as expected utility depending on the distribution of θ. Even though behavioral monitoring alleviates the moral hazard problem, it does not exclude the possibility of Type-I or Type-II errors occurring as a result of θ: A risk-averse M cannot share the risk θ with R but has to carry it alone. This can be an additional driving force inducing organizational failure.

The μ-term with $\mu>0$ in (26) implies that in a one-period game some agency costs resulting from the moral hazard problem still exist because a risk-averse R has to carry some of the control risk ψ_b, which is expressed by the density function $f^b(c_b|e)$ and its first derivative $f^{b'}(c_b|e)$. This one-period game can be

transformed into a multiperiod game which leads to similar results as for experience goods: The greater the number of periods ex ante contracted upon, the more the agency costs resulting from moral hazard problem decrease because R is able to diversify control risk ψ_b over several periods.

There is however an important difference between the case of experience goods and the case of credence goods. If R is risk-neutral, then additional behavioral monitoring in the case of experience goods has no value at all since R is indifferent to any risk reduction. The first-best solution is achievable independent of the observability of *e*. In the case of credence goods, behavioral monitoring is always valuable, even if R is risk-neutral. As R is then indifferent towards control risk ψ_b, the moral hazard problem will be resolved completely in a one-period game.

Depending on a comparison of the two types of risk, θ and ψ_b, c_b contains better or worse information on *e* than $\underline{D}$ does in the case of experience goods. If θ is smaller than ψ_b, then an equivalent reduction of agency costs by C_b in the case of credence goods will take more periods than by using the $\underline{D}$ in the case of experience goods if the number of periods is finite.

In the infinite model, a first-best solution can be reached with any C_b giving information on *e*, so that all agency costs resulting from the moral hazard problem vanish. Consequently, any C_b will be feasible in the infinite game if its costs K_{Cb} do not exceed this part of the agency costs resulting from the moral hazard problem.

Result monitoring:

Result monitoring can be interpreted as the acquisition of a message service $C_r=\{c_r\}$ emitting a signal $c_r \in C_r$ on the value of η as the result of R's effort[23]. consequently, c_r is stochastically correlated with Θ, but not with *e*. This implies that c_r would not vary with *e* if Θ was kept constant. If c_r gives only imperfect information on Θ, a monitoring risk ψ_r exists: c_r might wrongly indicate a high (or low) value of Θ. This risk is assumed to be stochastically independent of θ. We can express c_r as $c_r(\Theta,\psi_r)$.

A typical example for result monitoring in management accounting is quality auditing. This implies, for example, the auditing of data sources and methodology of established accounting systems to judge their applicability for particular decision problems. External auditing of financial reports is another form of result monitoring applied to financial accounting.

If a moral hazard problem exists, a contract B based on the result monitoring signal c_r can be used as an incentive devices: $B=B(c_r(Đ,\psi_r))$. Expressions (22) to (24) show the maximization program generating the optimal contract $B(c_r)$:

$$\max_{B(c_r)} E\left[U\left(Đ(e,\theta,c_r,\psi_r)-B(c_r)\right)\right] \quad \text{subject to} \tag{22}$$

$$E\left[N\left(B(c_r)\right)\right]-H(e)\geq V_{min} \tag{23}$$

$$e=\arg\max_{e'\in\{e\}}\left\{E\left[N\left(B(c_r)\right)\right]-H(e')\right\} \tag{24}$$

Note that in (22) the expectation M forms on $Đ$ is now dependant on e and the exogenous risk θ, as well as on c_r and the control risk ψ_r: M includes in his estimation of $Đ$ not only e, but also the result monitoring information $c_r \in C_r$.

If we have a closer look at C_r as a monitoring instrument for reducing moral hazard, we can interpret c_r as imperfect information on $Đ$ which itself contains imperfect information on e so that we can write:

$$p(c_r|e)=p(c_r|D)\,p(D|e) \tag{25}$$

(25) implies a garbling in the sense of Blackwell's (1953) theorem, so that C_r is a worse message service on e than all possible values D that form a message service $\{D\}$.

Solving the maximization program with the first order condition approach leads to the condition for the optimal payment scheme in the second-best case (Weißenberger, 1996: 208-12):

$$\frac{U'}{N'}=\lambda+\mu\frac{f^{r'}(c_2|Đ)f^{Đ'}(Đ|e)}{f^{r}(c_2|Đ)f^{Đ}(Đ|e)} \tag{26}$$

Condition (26) shows the garbling in the μ-term, increasing the risk R has to carry as incentive device in comparison to the case of experience goods: c_r gives worse information on e than $Đ$ would if it was known.

As the one-period game can be extended to a multiperiod game, R can diversify the overall risk imposed by $B(c_r)$ leading to a reduction of the risk premium he claims, but at a slower rate than in the case of experience goods because c_r as signal on e contains both risks θ and ψ_r. If the game is infinite, then R can diversify the overall risk he has to carry as an incentive device. In that case, the moral hazard problem is resolved completely.

Concerning the value of C_r we have the same result with result monitoring as with behavioral monitoring: the value of C_r is always positive in the case of credence goods, even with a risk-neutral R: here, the moral hazard problem again is completely resolved in a one-period game.

Additionally, risk-sharing between a risk-averse M and R now becomes possible based on a signal c_r emitted by C_r, but this is only a sharing of the overall risk including θ and ψ_r.

Monitoring systems for management accounting?

Our results show that both behavioral and result monitoring may in the case of credence goods help to reduce agency costs. Even if they are costly they may be feasible in a long term relationship. If accounting theory accepts a want of trust[24] in accounting systems as empirical phenomenon, then additional research in feasible monitoring should be considered. This should also include discussions of behavioral effects of monitoring, i.e., the causing of disutility with R, as well as the search for resource-efficient monitoring instruments.

The discussion of monitoring instruments also provides another aspect in explaining the growing inclination towards financial accounting: the external audits of financial reporting that are legally required can be interpreted as result monitoring, resolving the problem of organizational failure from want of trust in financial accounting. If the management has to choose between decision support from financial accounting or management accounting, it will choose the system that seems the most credible, which will under these conditions be financial accounting. If German management accounting has to win back once again its relevance, then resolving credibility problems in management accounting should be one of the challenges accounting theory has to attack in the future.

6. Conclusions

In this paper a growing loss of relevance of German management accounting has been explained by credibility doubts faced by management accounting in the presence of moral hazard problems. These moral hazard problems cannot be resolved by making payments to the agent which depend on the value of the outcome because the outcome itself is a credence good. A way to alleviate or even resolve moral hazard problems are costly monitoring instruments: behavioral monitoring or result monitoring. These instruments tend not to be feasible in the multiperiod case of experience goods, but in the multiperiod case of credence goods they do play an important role.

The question of credence goods as an agent's output has not yet been broadly analyzed in agency literature. In this paper it has been discussed in the light of a particular problem, i.e., the increasing loss of relevance of German management accounting. It should be interesting to consider this phenomenon for other credence goods as well, for example consulting or certain types of medical advice. Finally, it must be stressed that most empirical phenomena do not have one-dimensional but multi-dimensional explanations. The model we described may indeed throw some light on the German situation, but other explanations may also be valid. One could, for example, put forward the hypothesis that traditional management accounting systems are too cumbersome and inflexible for a fast changing managerial environment, so that the situation we observe in Germany is simply a transition from traditional management accounting to new systems which have not yet been developed (Weber, 1996; Weber and Weißenberger, 1996). This, too, will have to be further examined in future research.

---

1 This is for example expressed by Demski's (1973) model on the general impossibility of normative accounting standards. He states that "no set of standards exists that will single out the most preferred accounting alternative without specifically incorporating the individual's beliefs and preferences" (p. 720). Later, Pfaff (1994) points out that imputed cost types can be interpreted as security equivalents of a risk-averse decision maker.

2 An example would be the purchase of an article of clothing from a flea market stall compared to a similar purchase from a big chainstore. If it shrinks after the first

washing (experience characteristic), a guarantee can be claimed only at the chainstore, and not from the seller on the flea-market, who probably will be no longer there.

3 This is supported by Tirole (1988: 106) who states that "in a broad sense search goods include warranty goods".

4 The following example describes this problem: A decision maker is looking for the optimal alternative to invest his money. He has some knowledge on capital markets himself, e.g. the probable yield of some governmental and industrial bonds. He feels that additional information on other financial assets or the attached risk could help him find a better way to invest his money. He considers asking an investment counsellor for advice, but in fact does not know if the counsellor in question is a good or a bad expert. In the first case, following his advice will probably yield higher profits. But in the second case it would be better not to follow his counsel because the decision maker has a higher probability of choosing the ex post optimal alternative if he relies solely on his own judgment.

5 This is usually true for the relationship between manager and management accountant. Landsberg and Mayer (1988: 27) cite an empirical study that the average German management accountant has been employed by the same company for an average of twelve years.

6 $p(\bullet)$ does not denote a special function of $(\bullet)$ but only indicates a probability with $0 \leq p(\bullet) \leq 1$.

7 More formally, any function m attributing real numbers g to each $a \in \{a\}$ can be considered a method of valuation.

8 Weißenberger (1996: 84-5). Formally it is crucial that $\Sigma_z p(z)$ as well as $\Sigma_m p(m)$ add up to a finite number. This can easily be assumed because the $p(\bullet)$ denote probabilities.

9 This is a very stylistic perspective of the decision-making process. In reality, message services that serve as management accounting systems do not provide probability distributions, but only aggregated values like means, expectancy values, or security equivalents. The uncertainty of M between full costs and differential costs would probably be resolved by using differential costs, including a mark-up to consider the possibility that full costing may have been the better accounting system.

10 Noiseless message services can be ranked according to the much simpler criterion of fineness. It can be shown (Hartmann-Wendels, 1991: 44) that this criterion can be reconciled with Blackwell's theorem.

11 Note that $p(m|i') = \Sigma_i p(i) p(m|i', i)$ and that $\Sigma_i p(i) = 1$.

12 Note that $E[P_{\hat{a}}|i'] = \Sigma_i p(i) E[P_{\hat{a}}|i']$.

13 In the literature, examples on message services having a negative value are usually based on modifications of parameters of the decision matrix by acquiring information (e.g. Ackoff, 1958; Drèze, 1960), or by forcing one party to a given strategic behavior (Ponssard, 1976). This does not hold for the problem discussed here. The negative value results from listening to bad advice.

14 This is the case that Marschak (1954) considers: There is no damage in knowledge however small it may be because it is always compared to the situation of 'no knowledge at all'.

15 This seems to be a restrictive assumption because M should have to pay for a production technology, like data processing equipment, he has to provide R with. But as formal consideration of these costs do not change our basic results, we will neglect them in this paper.

16 If more than one e maximizes R's expected utility we assume that he will pick from these the one that is most favorable for M.

17 The variables of both periods are assumed to be stochastically independent.

18 Infinite contracts seem somewhat difficult to apply in real-world-situations, but Rubinstein (1979: 409) points out that the mathematical construct of infinity can be interpreted in game theory as the continuos expectation of a new game by the players, after each game has been finished. So any relationship without a fixed end could be taken as an infinite relationship in the sense of the theory.

19 If only R can observe the value of η, this is of no use to M because a utility-maximizing R will never truly report a value of η that might bring him a disadvantage.

20 Additionally, another difference to the case of experience goods has to be noted: As M does not know ϑ he may reject a message service η with a value $\vartheta \geq 0$ (Type-I error) or accept a message service η with a value $\vartheta < 0$ (Type-II error). This risk cannot be shared with R which leads to suboptimal contracts if M is risk-averse as well. The problem of Type-I/Type-II-errors will not be discussed further. For a more detailed analysis see Weißenberger (1996: 184-7).

21 Note that this discussion of accounting systems as a credence good deviates somewhat from the discussion of credence goods in other papers (e.g. Darby/Karni, 1973; Wolinsky, 1993; Taylor, 1995): These papers usually refer to repair services where the problem consists in agents trying to oversell service volume. This is not the case with decision support provided by the management accountant so that the traditional solution, i.e., the separation of diagnosis and repair, does not apply.

22 A detailed analysis of hidden organizational failure is given by Weißenberger (1996: 194-7). Another answer to this question could be that management accounting is not used for decision support at all, but only as a signal to shareholders, competitors or customers that management strives for efficient production. The loss of relevance then can be explained rather easily: as management accounting is a costly signal, it may be replaced by other, more informative or cheaper signals, e.g. the introduction of total quality management or a shareholder value concept.

23 This implies that through C_r the character of η changes partially from credence good to experience good. This does not contradict our definition of credence goods, if C_r is either costly or contains only imperfect information or both.

24 Trust in this context means a high expected utility U; distrust, in contrast, means a low expected utility U.

References

Ackoff, R.L. (1958): Towards a Behavioral Theory of Communication, *Management Science*, Vol. 4, pp. 218-234.

BFuP-Meinungsspiegel (1995): Aktuelle Überlegungen zur Gestaltung von Kostenrechnungssystemen, *Betriebswirtschaftliche Forschung und Praxis*, Vol. 47, p. 626-648.

Blackwell, D. (1953): Equivalent Comparisons of Experiments, *Annals of Mathematical Statistics*, Vol. 24, pp. 265-273.

Busse von Colbe, W. (1996): Accounting and the business economics tradition in Germany, *Europan Accounting Review*, Vol. 5, pp. 413-434.

Coenenberg, A.G. (1995): Einheitlichkeit oder Differenzierung von internem und externem Rechnungswesen: Die Anforderungen der internen Steuerung, *Der Betrieb*, Vol. 48, pp. 2077-2083.

Conroy, R.M. and Hughes J.S. (1987): Delegated Information Gathering Decisions, *Accounting Review*, Vol. 62, pp. 50-66.

Darby, M.R. and Karni, E. (1973): Free Competition and the Optimal Amount of Fraud, *Journal of Law and Economics*, Vol. 16, Issue: Oct., pp. 67-88.

Deakin, E.B. and Maher, M.W. (1994): *Cost Accounting*, Homewood/Ill.

Demski, J.S. (1973): The General Impossibility of Normative Accounting Standards, *Accounting Review*, Vol. 48, pp. 718-723.

Demski, J.S. and Sappington, D.E.M. (1987): Delegated Expertise, *Journal of Accounting Research*, Vol. 25, 1987, pp. 68-89.

Drèze, J.H. (1960): Le paradoxe de l'information, *Economique Appliquée*, Vol. 13, 1960, pp. 71-77.

Hartmann-Wendels, T.: *Rechnungslegung der Unternehmen und Kapitalmarkt aus informationsökonomischer Sicht*, Hamburg, 1991.

Holmström, B. (1979): Moral Hazard and Observability, *Bell Journal of Economics*, Vol. 10, pp. 74-91.

Horváth, P. (1992): Effektives und schlankes Controlling - Herausforderungen an den Controller, Horváth, P. (Ed.): *Effektives und schlankes Controlling, Stuttgart*, 1992, pp. 1-9.

Johnson, H.T. and Kaplan, R.S. (1987): *Relevance Lost. The Rise and Fall of Management Accounting*, Boston/Ma., 1987.

Laffont, J.J. (1989): *The Economics of Uncertainty and Information*, Cambridge.

Lambert, R.A. (1983): Long-Term Contracts and Moral Hazard, *Bell Journal of Economics*, Vol. 14, pp. 441-452.

Landsberg, G.v. and Mayer, E. (1988): *Berufsbild des Controllers*, Stuttgart.

Macneil, I.R. (1974): The Many Futures of Contracts, *Southern California Law Review*, Vol. 47, 1974, pp. 691-816.

Marschak, J. (1954): Towards an Economic Theory of Organization and Information, in: Thrall, R.M. et al. (Eds.): *Decision Processes*, New York, 1954, pp. 187-220.

Nelson, P. (1970): Information and Consumer Behavior, *Journal of Political Economy*, Vol. 78, pp. 311-329.

Pfaff, D. (1994): Zur Notwendigkeit einer eigenständigen Kostenrechnung. Anmerkungen zur Neuorientierung des internen Rechnungswesens im Hause Siemens, *Schmalenbachs Zeitschrift für betriebswirtschaftliche Forschung*, Vol. 46, pp. 1065-1084.

Ponssard, J.-P. (1976): On the Concept of the Value of Information in Competitive Situations, *Management Science*, Vol 22, pp. 739-747.

Radner, R. (1981): Monitoring Cooperative Agreements in a Repeated Principal-Agent-Relationship, *Econometrica*, Vol. 49, p. 1127-1148.

Reiß, M. and Höge, R. (1995): Controlling-Unterstützung für Center-Organisationen und Marktkoordination, *Der Betrieb*, Vol. 48, pp. 1721-1725.

Ross, S.A. (1973): The Economic Theory of Agency, *American Economic Review*, Vol. 63/II, 1973, pp. 134-139.

Rubinstein, A. (1979): An Optimal Conviction Policy for Offenses that May Have Been Committed by Accident, Brahms, S.S. et al. (Eds.): *Applied Games Theory*, Würzburg, pp. 406-413.

Schildbach, T. and Wagner, F.W. (1995): *Unternehmensrechnung als Instrument der internen Steuerung*. Tagung des Ausschusses Unternehmensrechnung im Verein für Socialpolitik am 31.3. und 1.4.1995 in Halle/Saale, Schmalenbachs Zeitschrift für betriebswirtschaftliche Forschung, Sonderheft 34.

Shavell, S. (1979): Risk sharing and incentives in the principal and agent relationship, *Bell Journal of Economics*, Vol. 10, 1979, pp. 55-73.

Taylor, C.R. (1995): The Economics of Breakdowns, Checkups, and Cures, *Journal of Political Economy*, Vol. 103, pp. 53-74.

Tirole, J. (1988): *The Theory of Industrial Organization*, Cambridge/Ma.

Weber, J. (1996): Selektives Rechnungswesen, *Zeitschrift für Betriebswirtschaft*, Vol. 66, pp. 925-946.

Weber, J. and Weißenberger, B.E. (1996): *Rechnungslegungspolitik und Controlling. Zur Gestaltung der Kostenrechnung*, WHU-Working Paper No. 39/1996, Vallendar.

Weißenberger, B.E. (1996): *Zur institutionalen Koordination der Informationsbeziehung zwischen Management und Rechnungswesen*, dissertation, WHU Koblenz.

Witt, F.-J. (1988): Mehr Markt für das innerbetriebliche Rechnungswesen, *Controller Magazin*, pp. 160-164.

Wolinsky, A.: Competition in a Market for Informed Expert Services, *Rand Journal of Economics*, Vol. 24, pp. 380-398.

Zeithaml, V.A. (1981): How Consumer Evaluation Processes Differ Between Goods and Services, in: Donelly, J.H. and George, W.R. (Eds.): *Marketing of Services*, Chicago, pp. 186-190.

Ziegler, H. (1994): Neuorientiertung des internen Rechnungswesens für das Unternehmens-Controlling im Hause Siemens, *Schmalenbachs Zeitschrift für betriebswirtschaftliche Forschung*, Vol. 46, pp. 175-188.

Forschungspapiere
der Wissenschaftlichen Hochschule für Unternehmensführung (WHU)
- Otto-Beisheim-Hochschule -

Lfd. Nr.	Autor	Titel
1	Weber, Jürgen	Theoretische Herleitung eines Controlling in Software-Unternehmen (Juni 1991)
2	Heinzl, Armin	Spinning off the Information Systems Support Function (Juni 1991)
3	Setzer, Ralf	Ergebnisse einer Befragung zur Beschaffungsplanung für zentrale Rechnersysteme (August 1991)
4.	Pfähler, Wilhelm Lambert, Peter	Die Messung von Progressionswirkungen (Oktober 1991)
5.	Pfähler, Wilhelm Lambert, Peter	Income Tax Progression and Redistributive Effect: The Influence of Changes in the Pre-Tax Income Distribution
6.	Pfähler, Wilhelm Leder, Thomas	Operative Synergie - von der Theorie zur Unternehmenspraxis (z.Zt. nicht erhältlich, wird überarbeitet)
7.	Wiese, Harald	Network Effects and Learning Effects in a Heterogeneous Dyopoly (Dezember 1991)
8.	Heinzl, Armin Stoffel, Karl	Formen, Motive und Risiken der Auslagerung der betrieblichen Datenverarbeitung (Januar 1992)
9.	Bungenstock, C. Holzwarth, J. Weber, Jürgen	Wegfallkosten als Informationsbasis strategischer Entscheidungen (Januar 1992)
10.	Lehner, Franz	Messung der Software-Dokumentationsqualität (August 1992)
11.	Heinzl, Armin Sinß, Michael	Zwischenbetriebliche Kooperationen zur kollektiven Entwicklung von Anwendungssystemen (August 1992)
12.	Heinzl, Armin	Die Ausgliederung der betrieblichen Datenverarbeitung
13.	Lehner, Franz	Expertensysteme zur Unterstützung der strukturorganisatorischen Gestaltung von Unternehmen
14.	Lehner, Franz	Brauchen wir eine Theorie der Wirtschaftsinformatik?
15.	Lehner,Franz, Setzer, Ralf Hofmann, Hubert	Wartung und Pflege von Wissensbanken

16.	Müller, Wolfgang Klein, Sebastian	Grundzüge einer verhaltensorientierten Preistheorie im Dienstleistungsmarketing
17.	Lehner, Franz	Considerations on Information System Strategies Based on an Empirical Study
18.	Lehner, Franz Hofmann, Hubert Setzer, Ralf	Maintenance of Knowledge Based Systems
19.	Lehner, Franz Sikora, Hermann	Wartung objektorientierter Softwaresysteme
20.	Lehner, Franz Röckelein,Wolfg.	Anwendung der Erfolgsfaktoren-Analyse zur Diagnose der betrieblichen Informationsverarbeitung
21.	Lehner, Franz	Gedanken und Notizen zur Entwicklung von Informatik-Strategien
22.	Albach, Horst	La Economia de la Empresa Como Ciencia
23.	Müller, Wolfgang	Konzeptionelle Grundlagen des Integrativen Dienstleistungsmarketing
24.	Weber, Jürgen Hamprecht, Markus	Stand und Anwendungsperspektiven des Controlling in Verbänden und ähnlichen Non-Profit-Organisationen (März 1994)
25.	Weber Jürgen Kummer, Sebastian Großklaus, Armin Nippel, Harald Warnke, Dorothée	Methodik zur Generierung von Logistik-Kennzahlen (Juni 1994)
26.	Kummer, Sebastian	Controlling Logistics in the German Automotive Industry (Juni 1994)
27.	Weber, Jürgen	Zur Bildung und Strukturierung spezieller Betriebswirtschaftslehren (August 1994)
28.	Weber, Jürgen Kaminski, Arndt	Zum Promotionsverhalten in der deutschsprachigen Betriebswirtschaftslehre (Oktober 1994)
29.	Rösler, Frank	Target Costing für komplexe Produkte Ein Diskussionsbeitrag zur Anwendungsproblematik des Zielkostenmanagements (März 1995)

30.	Weber, Jürgen Brettel, Malte Großklaus, Armin Hamprecht, Markus Rösch, Barbara E. Schäffer, Utz	Grundgedanken zur Entwicklung einer Theorie der Unternehmensführung (Mai 1995)
31.	Weber, Jürgen	Kostenrechnung-(s)-Dynamik - Einflüsse hoher unternehmensex- und -interner Veränderungen auf die Gestaltung der Kostenrechnung (Mai 1995)
32.	Weber, Jürgen	Selektives Rechnungswesen (Mai 1995)
33.	Weber, Jürgen	Controlling versus New Public Management als alternative oder sich ergänzende Konzepte der Umgestaltung öffentlicher Institutionen? (März 1996)
34.	Weber, Jürgen Goeldel, Hanns Schäffer, Utz	Zur Gestaltung der strategischen und operativen Planung (April 1996)
35.	Weber, Jürgen Brettel, Malte Schäffer, Utz	Gedanken zur Unternehmensführung (April 1996)
36.	Jost, Peter-J.	Crime, Coordination, and Punishment: An Economic Analysis (Mai 1996)
37.	Jost, Peter-J.	A Positive Economic Analysis of Law Enforcement (September 1996)
38.	Weber, Jürgen Weißenberger, B.	Relative Einzelkosten- und Deckungsbeitragsrechnung: A Critical Evaluation of Riebel`s Approach (November 1996)
39.	Weber, Jürgen Weißenberger, B.	Rechnungslegungspolitik und Controlling: Zur Gestaltung der Kostenrechnung (November 1996)
40.	Weißenberger, B.	Accounting as a Credence Good: An Attempt to Throw Some Light on the Recent Loss of Relevance of German Management Accounting (November 1996)
41.	Weißenberger, B.	Kundenbindung und Vertrauen in der Beziehung zwischen Wirtschaftsprüfer und Mandant (November 1996)
42.	Weber, Jürgen	Kostenrechnung am Scheideweg? (November 1996)