1. Introduction

Economic decisions in general result from a compromise between conflicting interests. The usual approach to find such a compromise is to aggregate the preferences of the interested parties. However, as shown e.g. by Arrow [1], a suitable aggregation may not exist - even if the individual preferences are operational and known to the decision-makers.

In order to find a compromise solution, a second possibility consists in the reduction of the set of feasible solutions by a number of generally accepted conditions such that finally only one solution remains feasible. The well-known option-pricing formula [2] may be seen as an example for this approach.

Concerning corporate decision-making, a condition that all interested parties generally agree with is the going concern postulate which states, that decisions should be made in such a way, that the corporation can continue its operations for an infinite number of time periods. One way to operationalize this postulate is to require, that the present value of consumable income should remain constant over time. This condition implies that the maximum amount to be paid out for consumption has to be equal to the interest rate times the present value of income.

Under certainty and a perfect capital market this concept of capital maintenance, first proposed by Irving Fisher [3], is easy to realize, since then the interest rate equals the market rate of interest. However, without the assumption of a perfect capital market, the question of a suitable interest rate arises.

The following approach is based on the assumption, that the interest rate should be equal to the marginal rate of return. As a consequence, for two corporations with the same capital stock but different investment opportunities, the condition of capital maintenance implies, that the corporation with the more profitable investment opportunities can pay out a higher amount for consumption. In what follows it will be shown, that this assumption generally leads to a unique feasible situation.
2. A formal description of the approach

Let $x = (x_1, ..., x_n)$ be a vector of activity levels for $n$ investment-, financing- and production possibilities within a given planning period of $T$ periods,

$c = (c_1, ... , c_T)$ a consumption-vector and

$r = (r_1, ... , r_T)$ a vector of interest rates.

$(x, c, r,)$ is called a capital maintaining solution (cms), $c$ a capital maintaining consumption vector (cmc) if the following conditions are met:

$C_1$ (Feasibility): $(x, c)$ satisfies

$$\sum_{j=1}^{n} -a_{0j}x_j = b_0$$

$$c_t = \sum_{j=1}^{n} a_{tj}x_j + b_t \quad t = 1, \ldots, T$$

$$0 \leq x_j \leq k_j \quad j = 1, \ldots, n$$

where

$a_{tj} =$ unit cashflow of activity $j$ in $t$

$b_t =$ decision independent cashflow in $t$

$k_j =$ upper limit for activity $j$ (e.g. a demand or credit restriction).

$C_2$ (Capital Maintenance): $(c, r)$ satisfies

$$c_t = r_t \cdot E \quad t = 1, \ldots, T-1$$

$$c_T = (1+r_T)E$$

where $E = \sum_{t=1}^{T} c_t q_t$, $q_t = \prod_{t=1}^{T} (1+r_T)^{-1}$

$C_3$ (Interest rate determination): $x$ satisfies

$$PV_j > 0 \Rightarrow x_j = k_j$$

$$PV_j < 0 \Rightarrow x_j = 0$$