

## Applicability of Compound External Discount

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**Abstract** – Interest, which is known as the rent of money, is one of the most important processes of business life. Throughout history, interest has maintained its importance. People have made money transactions with interest since the known date. It has even been instrumental in the emergence of various fights and even wars. The most common procedure in interest transactions is undoubtedly discount transactions. Throughout the history, discount transactions were discussed. It has been applied in various ways. Sometimes they are subjected to regular and sometimes random processes. The discount can be encountered in a simple case, as well as in the case of compound discount. The compound discount can be applied in two types: internal discount and compound external discount. The compound internal discount is available in each book. However, there are negative sentences about the applicability of the compound outer seal. However, the composite external discount is also applicable. In this study, the applicability of the compound external discount, which should be done if the nominal value documents such as long-term bonds, checks are paid in person, have been investigated. It is alleged that compound exemptions can not be applied in studies on external discounts in existing works. In this study, a theorem on compound external discounting is developed, and this theorem is tried to show applicability on equivalents.

**Keywords** – Compound Discount, Compound External Discount, Compound Internal Discount.

### I. INTRODUCTION

The discount, which is an important aspect of the business field, is the opposite of interest processing. When interest is paid on a money rent, the discount on the early payment of the debt is called discount. Discount is divided into simple discount and compound discount. A simple discount is a check with a nominal value or a one-time discount at a time. But compound discount is applied when discounting a long-term and compound interest applied document. The compound discount is of two kinds. One is a combined external discount, the other is a combined internal clock. The combined external discount is based on the nominal value (written on the document). The other is a combined internal scooter, this is a discount scatch. The compound external discount is claimed not to apply in existing books. This study investigated the feasibility and feasibility of the compound external shunt.

**Definition 1.** It is defined as the deduction made on a money paid before the discount coupon. [2] A futures exchange is a process of exchanging cash. Discount transactions are generally used in the case of a turnover

without a senedi or coupon valley, which is a negotiable document.

**Definition 2.** If the discount rate is calculated on the nominal (credit) value, ie the future value, this is called a simple external discount [3], if the discount rate is a value in advance, ie the present value. Accordingly, C is the nominal value,  $I_d$  is the discount amount, i is the discount rate, n is the simple external discount;

$$I_d = C.i.n$$

is known. In the discounting process, the simple external discount is

$$P = C - I_d = C(1 - nt)$$

although it is indicated by the value P in advance [4,5].

Compound discounts are compounded with compound interest if compound interest is applied and premature payment is involved in long-term transactions over one year. The compound discount is a combined discount rate. The compound external discount is calculated on the basis of the nominal value, as the discount rate is a simple internal value [1]. The calculation is based on the compound internal value (present value) [2].

## II. MATERIALS AND METHOD

**Theorem 1.** C is the nominal value, P is the present value of cash to be paid, i is the discount rate, t is the compound external discount;

$$P = C.(1-i)^t$$

shape.

Proof: If simple discount is applied at the end of the first period,  $P = C.(1-i)$ .

If simple discount is applied at the end of the second period,

$$P = C.(1-i)(1-i) = C.(1-i)^2$$

If a simple discount is applied at the end of the third period,

$$P = C.(1-i)^2(1-i) = C.(1-i)^3$$

...

At the end of the t-th period, (t-1) st period is know and if the basic discount is applied result  $P = C.(1-i)^t$ . This completes the procession.

According to this theory, the external discount amount  $I_d$  in the discounting operation is in the

$$I_d = C.[1-(1-i)^t]$$

shape.

**Theorem 2.**  $1 \leq k \leq n$  ve  $k \in \mathbb{N}$  for  $A_k$  the nominal value of existing bill,  $t_k$ , credit of existing bills,  $1 \leq \ell \leq m$  and  $\ell \in \mathbb{N}$  for  $C_\ell$ , the nominal values of new bills,  $u_\ell$ , the credit of new bills, P, the amount that is paid today, i, discount rate, equivalent bills, according to compound discount happens like this;

$$\sum_{k=1}^n A_k (1-i)^{t_k} = P + \sum_{\ell=1}^m C_\ell (1-i)^{u_\ell} .$$

In this the discount rate can also be applied variably.

## III. RESULTS

The Books of Finance Mathematics interpret the notion of using a composite code as follows:

$$P = C - I_d$$

$$I_d = C(1+i)^t - C$$

$$P = C - [C(1+i)^t - C]$$

$$P = C[2 - (1+i)^t]$$

If it is  $[2 - (1+i)^t]$  in the last equation, the value in advance is zero. This means that no money is paid to the discounted bills.  $(1+i)^t > 2$  If it is YY, the advance value is negative. Such a situation is not possible from an application point of view. It is not possible for a person to hold a sack without giving or paying money. For this reason compound discount is not used in practice. [1]

In the existing books, it is written that the compound external discount should not be used from the above reasons. However, there is a sign error and formulation error in this data. There is a - (minus) sign in the plus (+) sign when defining a simple external discount. The next step, compound external discount, must be marked with a - (minus) instead of + (plus). Again some of the books on Finance Mathematics replace the positions of pre-valued concepts with the discount amount. These changes and pointed out the error of claiming that the discount is not used outside the compound. We have proved in our theorems that the compound external discount can be used as a compound internal discount.

Here, too, if the compound internal scoop is to be recalled, It's in

$$P = \frac{C}{(1+i)^t}$$

format. Now let's give an example that compound external discount is also applicable as compound internal discount.

**Example 1.** A check with a nominal value of \$ 18,000 has a 3-year maturity. When this check is discounted with an internal discount rate of 15%, we will find the current value of the check according to both compound external and composite internal discount.

$$\text{Answer: } C = 18000 \$ , t = 3 \text{ year} , i = \frac{15}{100}$$

If compound external discount is applied,

$$P = 18000.(1-0,15)^3 = 11054,25 \$$$

If compound internal discount is applied,

$$P = \frac{C}{(1+i)^t} = \frac{18000}{(1+0,15)^3} = 11835,29$$

As can be seen, the compound external discount is made on the nominal value, so the compound internal charge is further reduced. Just as the simplicity of a simple external squeeze is more than a discount on a domestic squeeze.

As a result, it can be said that; Financial Mathematics books outside the compound discounting While explaining, wrote that they were unusable and pointless. If formulated as above can be used, whereas the compound of discounting commercial life.

#### REFERENCES

- [1] Başkaya Z., Alper D., Finance Mathematics, Ekin Publishing House, Bursa, 2003.
- [2] Başkaya Z, Commercial Mathematics, Ekin Publishing House, Bursa, 2011.
- [3] Ertuğrul İ., Basic Mathematics, Ekin Publishing House, Bursa, 2012.
- [4] Parlak S., Commercial Mathematics for Vocational School, Ekin Publishing House, Bursa, 2014.
- [5] Zehir H., Commercial Mathematics, Murathan Publishing House, Bursa, 2011.