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## **MEASURING THE COMPANY'S REAL PERFORMANCE BY PHYSICAL CAPITAL MAINTENANCE**

***Abstract.** The measurement of profit depends on the concepts of capital maintenance used by the company in preparing its financial statements. The IASB Framework offers the option of choosing between two concepts of capital maintenance: financial capital and physical capital. This study highlights the adverse consequences of financial capital maintenance and supports for the recognition of profits by maintaining the physical capital. In this study we proposed a theoretical model to calculate the real profit by maintaining the physical capital. The model is applied for all Romanian production companies listed with available data by the restatement of information disclosed in the financial statements. The results demonstrate that the model based on physical capital maintenance captures the company's real performance. This model could be an alternative to the model based on financial capital maintenance which operates nowadays on the financial markets.*

**Key words:** *physical capital, capital maintenance, profit, Romania, accounting, performance, IFRS, conceptual framework.*

**JEL Classification:** G31, M41

### **INTRODUCTION**

The IASB Framework allows companies to choose between two concepts of capital maintenance: financial capital, respectively physical capital. In this context arises the following question: Can the users choose the concept of capital to be maintained by the company? The answer is obviously “no” from at least three reasons: firstly because users still do not know the significance of the concepts of capital maintenance and the influence they have on the measurement of income; secondly because the law framework specific to each country implies, in most cases, the maintenance of financial capital in nominal monetary units, and only in exceptional cases (hyperinflation) the maintenance of capital in constant purchase power units; and thirdly because it is not yet established a reliable model for maintenance of physical capital that can be put in application, when it would be

possible the option stipulated in the IASB Framework of choosing the concept of capital to be maintained.

As long as all international financial reporting standards (IFRS) support only the financial capital maintenance, it is clear that IASB guidance supports the concept of financial capital maintenance. This is because the profit of the company is measured using the concept of financial capital maintenance. The profit is a concept that we all consider to know and appreciate its worth. However, being used in the business environment, the profit concept acquires a different meaning from the one we perceive at individual level. In addition to this, in an inflationary environment or in an environment affected by the continuous increase in prices, the profit that companies present does not reflect the economic reality anymore. This article brings into discussion the physical capital maintenance for the inflationary economies like the alternative of the actual financial maintenance concept.

The concepts relating to capital maintenance are very important in measuring the profit that reflects the economic reality of the business environment in which the company operates. However, in terms of price growth, to apply the concept of financial capital maintenance can have devastating consequences on company level, if the "fictional" profit made by it is fully distributed as dividends. This article aims to show the danger of applying financial capital maintenance at the expense of maintaining physical capital, when the company operates in an environment of steady price increases.

This research was started from the idea that nowadays the financial markets (especially the players on the markets) need relevant financial information about the companies which are listed. The financial statements disclosed by the companies are generally prepared by taking into account the accounting model based on recoverable historical cost and on the nominal financial capital maintenance concept. But when prices increase, if the profit is paid in dividends, the company will lose the ability to maintain its operating capability. To avoid this, we developed and proposed, as solution, a model to maintain the physical capital. The argument is that "true profit" is obtained when there is an increase in physical capital because this is the amount that can be paid in dividends without reducing the number of physical units of the company (Sterling and Lemke, 1981).

The contributions of this article are threefold. First, it informs users of accounting information of the extant gaps and weaknesses in the measurement of income by maintaining the financial capital in comparison with physical capital; second, it proposes a model for maintaining the physical capital; third, it realizes a comparative analyses between financial and physical maintenance capital for the Romanian production companies, emphasizing the superiority of the physical capital in reflecting the real performance of the company. This article is structured as follows: *Chapter 1* presents the concept of physical capital, *Chapter 2* presents the theoretical model created in order to maintain the physical capital of the companies by the restatement of financial statements, and *Chapter 3* present the validation of the theoretical model regarding maintenance of physical capital for production companies listed on the Bucharest Stock Exchange (BSE). The paper

concludes with the authors' conclusions regarding the advantages of maintaining physical capital.

## **1. PHYSICAL CAPITAL MAINTENANCE CONCEPT**

### **1.1. About the physical capital maintenance concept**

In literature, very little has been written about the concept of the physical capital maintenance. Therefore, being no theoretical framework for measuring profit by maintaining physical capital, no practical application of this concept has been possible. Following the evolution in time of the works that address the issue of maintaining physical capital, we emphasize several points of view from which results the quality of physical capital maintenance in reflecting the real profit of the company.

Analysing the concept of capital maintenance from the economic point of view, Hayek (1935) recommends that in the capital evaluation process it should be taken into account that the economic environment is constantly changing and that it is not justified to maintain the initial capital at the same level as it was before the change. Although it is accepted that physical capital maintenance reflects the real profit of a company, to measure the physical capital is more difficult than to evaluate the financial capital. However, it is not impossible. Gynther (1970) associates physical capital with the operational capacity of the company which requires that all long-term capital should be restated in line with the increase of the purchasing costs in the market relating to individual assets. The author proposes three possibilities to measure the operational capacity of the company, which have been replicated in the Sandilands Report (1975): current assets held; machines and other assets incorporating any technological improvement needed to produce the same volume of goods and services; machines and other assets incorporating any technological improvement needed to produce the same value of goods and services.

Securities and Exchange Commission (1976) defines production capacity by the number of units that can be produced and distributed in a certain period of time. The most commonly used basis of evaluation to maintain the production capacity of a company is usually the replacement cost. Edwards and Bell's (1961) consider that the current cost of assets that are currently held by the company should be used to evaluate the replacement cost, even if there were technological changes. Regarding the production capacity, Agrawal (1977) considers that it changes, which is why non-current assets should be replaced. Therefore, in the business practice, he recommends to simultaneously maintain the production capacity and the purchasing power by proposing a method called "loss of inflation".

Sweeney (1980) supports the maintenance of physical capital by preserving the same amount of material, physical objects and recommends this approach in the business practice when prices rise rapidly due to monetary inflation. Revsine (1981), analysing the relationship between the concepts of capital maintenance and profit, suggests to choose the concept of capital maintenance depending on what

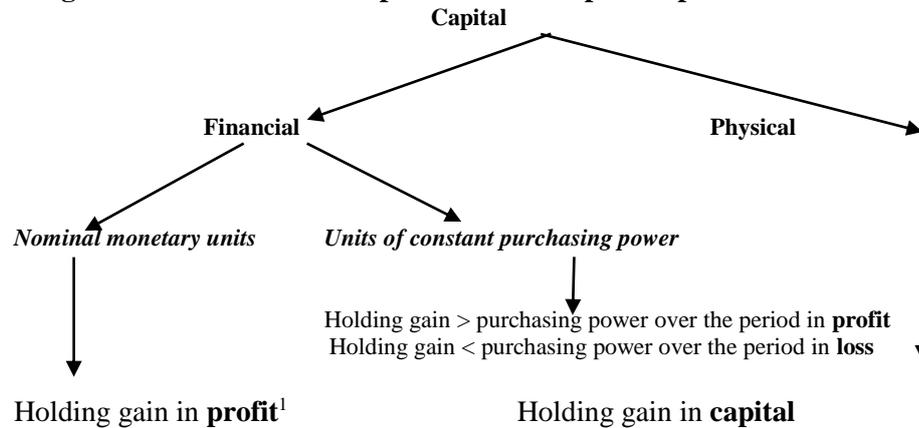
the investor seeks. In a subsequent article, Sweeney (1988) recommends that in the capital evaluation, the unit should be firstly determined, and then the number of units that must be included in the evaluation, there being two main types of units: a unit of physical measurement and a monetary unit.

Riahi-Belkaoui (2004) analyses two possibilities of physical capital maintenance: maintaining the production capacity in nominal monetary units and maintaining the constant purchasing power by maintaining the productive capacity. Alexander et al (2007), examining the concepts of capital maintenance, associates physical capital with the operational capacity that reflects the company's ability to replace business resources.

### 1.2. Theoretical aspects regarding the capital maintenance

The IASB Framework proposes the following concepts of capital maintenance: *financial capital maintenance* which can be measured in either nominal monetary units or units of constant purchasing power, and *physical capital maintenance*. The principal difference between the two concepts of capital maintenance is the treatment of the effects of changes in the prices of assets and liabilities of the company (Figure 1).

**Figure 1. Relation between profit and concept of capital maintenance**



The concept of financial capital maintenance in nominal monetary units defines the profit as being the increase of the nominal capital over the period. The increase in asset prices during a period, known as holding gains, means profits. They may still not be recognized until the sale of those assets. This concept is based on the preservation at the level of balance sheet structures, of the input values which are historical values, and which will be corrected by any subsequent

<sup>1</sup>They may not be recognised as such, however, until the assets are disposed of in an exchange transaction.

depreciations and impairments. Therefore, this concept calls for historical cost as the measurement basis. But the current regulations from some standards provide the assessment at current values, particularly the fair value. Fair value measurement is justified by the current economic context where there are significant price variations in the assets of the company, particularly in financial assets. As an alternative to the historical cost accounting, in order to maintain the financial capital in nominal monetary units there is the accounting for inflation that adapts to the concept of financial capital maintenance in constant purchasing power units, according to which profit represents the increase of the purchasing power that was invested during the period. Given the rising asset prices, profit represents only what exceeds the general price increase. Accounting for inflation takes into account the aggregate revaluation of items in financial statements by the developments in the general price level and the delimitation of the balance items in: monetary items and non-monetary items. The non-monetary items include: property, inventories and equity, these not being affected by the general price increase because inflation does not affect the characteristics of these items. Instead, the purchasing power of the monetary items, which include receivables, liabilities and liquidities, decreases under inflation, for which reason there must be calculated a gain or a loss on the net monetary position.

However, by financial capital maintenance, the recognition as profit of the realized or unrealized holding gains, followed by the distribution of these gains as dividends, leads, on the short term, to the inability to maintain the operating capacity of the company, and on the long term, to the bankruptcy of the company. It is probably the main reason why the conceptual framework included as an option to recognize the profit: the physical capital maintenance. The consequences of physical capital maintenance consist in assuring the stability of the activity performed by the company and in avoiding the entity disinvestment in the conditions of prices increase due to knowledge of the maximum level of income that can be distributed as dividends with the purpose of maintaining the operating capability. Under a physical capital concept, such as operating capability, capital is regarded as the productive capacity of the company, the profit representing the increase of the physical capital during the period. Price changes affecting the assets and liabilities of the company are not considered profit; they are treated as adjustments to maintain the capital level that are recognized directly in equity. The profit obtained by the maintenance of physical capital is named differently: *current cost income from continuing operations* (Revsine, 1981), *income from productive-capacity maintenance or income from general purchasing-power, productive capacity maintenance* (Riahi-Belkaoui, 2004), *operating profit* (Alexander et al, 2007).

The concept of capital maintenance should be considered in relation to the concept of profit, as the IASB Framework states that: „The concept of capital maintenance ... provides the linkage between the concepts of capital and the concepts of profit because it provides the point of reference by which profit is measured”. Should we measure (quantitative) the physical capital or/and should we

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evaluate it (as a value)? To answer this question we will appeal to the statements of the IASB Framework regarding the income that should be recognized in case of physical capital maintenance: „Under this concept a profit is earned only if the physical productive capacity or (operating capability) of the entity (or the resources or funds needed to achieve that capacity) at the end of the period exceeds the physical productive capacity at the beginning of the period, after excluding any distributions to, and contributions from, owners during the period.”

As can be noted in the paragraph above, the Framework offers the option to maintain the physical capital in quantitative terms (*physical productive capacity* or *operating capability*) or in terms of value (*the resources or funds needed to achieve that capacity*). As seen from the above definition, in quantitative terms, the physical capital represents *physical productive capacity* or *operating capability*. There are several ways to define from the quantitative point of view the *physical productive capacity* or *operating capability*:

a) *the productive capacity of the entity based on, for example, units of output per day*”. (IASB Framework).

b) *normal productive capacity* which is “*the production expected to be achieved on average over a number of periods or seasons under normal circumstances, taking into account the loss of capacity resulting from planned maintenance. The actual level of production may be used if it approximates normal capacity*” (IAS 2, Article 13)

c) *the actual assets currently possessed* which imply the use of the current market prices for evaluation of assets actually possessed throughout their lifetime (Sandilands Report, 1975)

d) *the latest equipment and other assets incorporating any technological improvements needed to produce the same value of identical goods and services* which imply the use of the current market buying prices of any such latest equipment, and it takes care of any reduction in the current unit selling price of goods and services produced with the technologically improved equipment (Sandilands Report, 1975)

e) *the latest equipment and other assets incorporating any technological improvements needed to produce the same volume of identical output of goods and services* which imply the use of the current market buying prices of this latest equipment (Sandilands Report, 1975)

The above mentioned options to define physical capital highlight the lack of a consensus on the definition of physical capital in terms of quantity. We believe that the definition of physical capital in terms of the *number of units of output per day* or in terms of *production expected to be achieved on average over a number of periods or seasons* is limited and allows only partial maintenance of physical capital. Defining physical capital in terms of *actual assets currently possessed* requires the use of current cost in evaluation of assets and it is consistent with the recommendation of the IASB, under which: “*The physical capital maintenance concept requires the adoption of the current cost basis of measurement.*” (IASB Framework). But the maintenance of *actual assets currently possessed*, although it

maintains operating capability, it increases the distance in terms of efficiency of the company towards competing ones that use more modern assets that can achieve the same number of products at a much lower cost. Therefore, we believe that physical capital maintenance should not seek to maintain operating capability "at any price" but the maintenance of operating capability to increase the effectiveness of the company. To achieve this objective of increasing the economic efficiency, the company shall maintain the *latest equipment and other assets incorporating any technological improvements*. These arguments are consistent with Hayek (1935, p.248) which considers that: „To maintain capital intact is not an aim in itself; it is only desired because of certain consequences which are known to follow from a failure to do so” and recommends that in the process of evaluating the capital should be taken into account the fact that the economic environment is in a continuous change and it is not justified the maintaining of initial capital at the same level as before the change.

In terms of price growth, even if the company maintains the *same value of identical goods and services*, the operating capability of the company reduces and thus the physical capital is no longer maintained. The current economic context in which changes are omnipresent, require the companies the reorientation of activity by getting new products to meet the customers' demands. To make operational the concept of physical capital maintenance, the company must maintain the *same volume of equivalent output of goods and services and not the same volume of identical output of goods and service*. Therefore, to maintain physical capital in quantitative terms there must be maintained the *latest* equipment and other assets incorporating any *technological improvements* needed to produce the *same volume of equivalent* output of goods and services.

## **2. THE THEORETICAL MODEL OF PHYSICAL CAPITAL MAINTENANCE**

In order to show the impact into the real activity of the company of the maintenance of physical capital, we created a model for maintaining the physical capital by the restatement of the financial statements for all production companies listed on BSE with available data for the analysed period. The calculation of profit by physical capital maintenance was done by restating the items of the financial statements with specific indices of price growth in Romania.

To maintain its operating capability, the company must assess the tangible and intangible assets to new replacement cost. Because it is impossible to determine this value for fixed assets held by the analysed companies, we proceeded to the restatement of these elements according to specific indices of price growth. For tangible and intangible, the restatement was performed continuously, in the sense that the amount restated at the end of a year was determined starting from the restated value at the end of the previous year to which there were added the entries of fixed assets restated with the ratio between price growth at the end of the year and average price growth of the year, and there were taken the outputs of fixed

assets restated with the ratio between the average price growth of the year and price growth at the beginning of the year (*Annex 1, Sections 1,2*). As production companies must allow the replacement of tangible and intangible assets that support the operating process in order to maintain the physical capital, the value from the balance sheet is recognised to equity in an account which we call "Intangible/Tangible Assets Adjustments" (IAA/TAA). The accounting records that should be made in order to reflect the differences that were calculated are presented in *Annex 2, Sections 1,2*.

Current and noncurrent financial assets are not restated to maintain physical capital because they do not have connection with the operating activity of the company and they do not affect the physical capital maintenance.

In order to maintain its operating capability, the company must assess inventories at their current cost. Because it is impossible to determine this value for the inventories held by the analysed companies, we proceeded to the restatement of these elements in terms of specific indices of price growth (*Annex 1, Section 3*). The differences between the restated value of inventories and their book value from the balance sheet are recognized to equity in an account which we call "Stock Adjustments" (SA). The accounting records that should be made in order to reflect the differences that were found are presented in *Annex 2, Section 3*.

The components of monetary working capital (MWC) participate and support the current business (operational) of the company, for this reason it has to cover the depreciation in value of these items in terms of price growth (*Annex 1, Section 4*). Since they are monetary items, their value in the balance sheet cannot be changed. Consequently, adjustments of the monetary working capital are recognized on the one hand, in the profit and loss account and on the other hand in equity as "Monetary Working Capital Adjustments" (MWCA). In terms of price growth, if the sum of the receivable and cash is higher than the value of current liabilities, the company records a loss. But, if the sum of receivable and cash is less than the sum of the current liabilities, the company records a profit. The accounting records to be performed in this respect are presented in *Annex 2, Section 4*.

The maintenance of operating capability must be done both by funding from the owners and by external financing, on short/long term. The adjustments determined by current liabilities have already been included in the MWCA calculation, which is why we must also establish the adjustments determined by noncurrent liabilities to fund the operating activities. In terms of price growth, if a company is long-term financed, it makes a profit because it has to repay the same amount of money in nominal monetary units, but it is less in units of constant purchasing power. In establishing the "Noncurrent Liabilities Adjustments" (NLA) it was taken into account the earnings generated by long-term debt to finance assets involved in maintaining the operating capacity of the company (*Annex 1, Section 5*). NLA represents for the company a gain which is recognised as revenues that affects profit and loss account, on the one hand, and as adjustments to maintain the physical capital which are reflected in equity, on the other hand. The recognition of gains obtained from long-term debt of the company is presented in *Annex 2*,

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*Section 5.* Because the financial assets do not participate in maintaining the operating capability they were eliminated from NLA.

In the profit and loss account, physical capital maintenance requires to the company to be able to cover the current cost of operating expenses from the operating revenues. Thus, operating expenses (without depreciation expenses which were restated separately) have been restated with the average specific index of price growth (*Annex 1, Section 6*). The differences from operating expenses restatement reduce the profit obtained to maintain physical capital, being recognised in an account of adjustments named "Operating Expenses Adjustments" (OEA). *Annex 2, Section 6* presents the recognition of operating expenses restatement. Because in the income statement of the analyses companies the depreciation expenses were calculated based on historical cost, in order to maintain the physical capital we restated their value by the formula presented in *Annex 1, Section 7*. The differences from depreciation expenses restatement reduce the profit obtained to maintain physical capital, being recognised in correspondence with an account of adjustments named "Depreciation Expenses Adjustments" (DEA). *Annex 2, Section 7* presents the recognition of depreciation expenses restatement.

Financial revenues and expenses have not been restated because they are not generated by the operating activities of the company. Moreover, income tax expenses have not been restated because income tax is recorded at the end of the year.

The calculation of profit by physical capital maintenance was determined by adding the adjustments that affected the profit and loss account to the profit made by financial capital maintenance, as follows: monetary working capital adjustments, operating expenses adjustments, depreciation expenses adjustment and noncurrent liabilities adjustments (*Annex 1, Section 8*). Physical capital was calculated by adding to the financial capital all adjustments performed to maintain physical capital, as shown in *Annex 1, Section 9*.

### 3. QUANTITATIVE ANALYSES

#### 3.1. Valuation models

In order to test if the physical capital and profit measured by physical capital are relevant for investors' decisions we started from the price model (Ohlson, 1995). Ohlson model and its subsequent refinements (Ohlson and Juettner-Nauroth, 2005; Ohlson, 1999, 2001, 2005, 2009; Feltham and Ohlson, 1995) is the most used model in the value relevance analysis of accounting information. Ohlson's model represents firm value as a linear function of book value of equity and the present value of expected future abnormal earnings. The model assumes perfect capital markets, but permits imperfect product markets for a finite number of periods (Barth, Beaver, and Landman, 2001). The assumption that the amounts reflected in share prices are the "true" variables is stronger than the assumption of market efficiency: the market's estimates are not just unbiased, they are error-free

(Holthausen and Watts, 2001). In our study we started from the modified Ohlson (1995) and Feltham and Ohlson (1995) in which the share price can be written as a linear function of book value of equity and earnings. This model was also used in the studies of Francis and Schipper (1999), Collins, Maydew, and Weiss (1997), Jianu et al. (2014) and others, in order to analyse the value relevance of accounting information. The *price model* used in this current study is the following:

$$PRICE_{t,i} = \alpha_0 + \alpha_1 EQUITY\_FC_{t,i} + \alpha_2 EPS\_FC_{t,i} + \varepsilon_{t,i} \quad (1)$$

$PRICE_{t,i}$  –share price for the year  $t$  of the firm  $i$ ;  
 $EQUITY\_FC_{t,i}$  –book value of equity per share for the year  $t$  of the firm  $i$ , calculated by maintaining the financial capital;  
 $EPS\_FC_{t,i}$  –annual earnings per share for the year  $t$  of the firm  $i$ , calculated by maintaining the financial capital;

To highlight the importance of measuring profit by adopting the concept of physical capital maintenance, we used also the price model changing, on the one hand, book value of equity per share calculated by maintaining financial capital with the book value of equity per share calculated by maintaining the physical capital, and on the other hand, the earning per share variable calculates by maintaining financial capital with the earning per share variable calculated by maintaining the physical capital. The *changed price model* used in this current study is the following:

$$PRICE_{t,i} = \beta_0 + \beta_1 EQUITY\_PC_{t,i} + \beta_2 EPS\_PC_{t,i} + \varepsilon_{t,i} \quad (2)$$

$PRICE_{t,i}$  –share price for the year  $t$  of the firm  $i$ ;  
 $EQUITY\_PC_{t,i}$  –book value of equity per share for the year  $t$  of the firm  $i$ ; calculated by maintaining the physical capital;  
 $EPS\_PC_{t,i}$  –annual earnings per share for the year  $t$  of the firm  $i$ , calculated by maintaining the physical capital;

We use both  $R^2$  and regression coefficients in order to assess the value relevance of accounting information by maintaining the physical capital.

### 3.2. Data collection

On BSEthere were traded a number of 104 companies at data collection, May 2011. Because the measurement of profit by physical capital maintenance is addressed predominantly to production companies, in testing the model of physical capital maintenance there have been eliminated the companies providing services

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and the financial institutions. Also we eliminated the unlisted companies<sup>2</sup> and the companies for which there are not available data (Table 1).

**Table 1. Data collection**

<b>Companies listed on BSE:</b>		
Manufacturing industry		70
Construction		6
Servises		15
Financial institutions		13
<b>Total (May 2011)</b>		<b>104</b>
- Companies providing services		15
- Financial institutions		13
- Non listed companies		16
- Companies without available data for 2005-2008 periode		16
<b>Number of companies for this study</b>		<b>44</b>
Manufacturing industry		41
Construction		3

The calculation of profit by physical capital maintenance was done by restating the items of the financial statements with specific indices of the manufacturing sector (for the 41 manufacturing companies) and specific indices of construction sector (for the 3 companies from the construction sector). Specific indices of price growth used in the model are calculated quarterly by the National Institute of Statistics of Romania (Table 2).

**Table 2. Specific index**

	2005		2006		2007		2008	
	IND	CUM	IND	CUM	IND	CUM	IND	CUM
Manufacturing								
Quarter I	102.2	102.2	100.5	100.5	104.2	104.2	102.6	102.6
Quarter II	105.0	107.4	102.8	103.4	102.3	106.6	104.8	107.5
Quarter III	102.4	110.0	101.6	105.0	101.8	108.5	101.5	109.1
Quarter IV	103.7	<b>114.1</b>	104.1	<b>109.4</b>	105.7	<b>114.7</b>	104.7	<b>114.3</b>
Average index	<b>107.0</b>		<b>104.7</b>		<b>107.4</b>		<b>107.2</b>	
Construction								
Quarter I	105.7	105.7	98.3	98.3	104.1	104.1	105.0	105.0
Quarter II	101.8	107.6	105.1	103.4	101.1	105.3	104.6	109.9
Quarter III	102.6	110.4	102.2	105.7	101.2	106.5	105.1	115.5
Quarter IV	105.2	<b>116.1</b>	103.4	<b>109.3</b>	104.1	<b>110.9</b>	97.2	<b>112.3</b>
Average index	<b>108.1</b>		<b>104.6</b>		<b>105.4</b>		<b>106.2</b>	

IND – individual, CUM - cumulative

<sup>2</sup> A company is considered unlisted if it is non follows the conditions for one of the three categories: For an entity to be listed in Category I, it must meet the following conditions: at least 25% of the shares to be publicly distributed, the shares must be publicly distributed to at least 2,000 people, equities in the last financial year to be more than EUR 30,000,000, to be profit in the last two years and to submit a business plan for at least the next three years. For an entity to be listed in Category II, equities in the last financial year must to be more than EUR 2,000,000. For an entity to be listed in Category III equities in the last financial year must to be more than EUR 1,000,000.

The data were taken from the online database [www.securities.com](http://www.securities.com), section Emerging Markets Information Systems-Romania-Financial Markets, from the site of the National Securities Commission of Romania from the "Reports of Issuers" and from the BSE website, the "Companies - List of companies". We have chosen the period 2005-2008 because until 2004 there was an inflationary period in Romania and beginning with the year 2009 the financial crises was felt on the Romanian capital market.

### 3.3. Descriptive statistics

Table 3 presents descriptive statistics for the variables in the price model, by maintaining the financial capital and the physical capital. The average share price over a four-year period is 3.560 while the median is lower, 0.568. The standard deviation is high, 8.875 with a minimum value of share price of 0.014 and a maximum value of 50.800. The average value of equity by maintaining the physical capital (8.803) is greater than the mean of the book value of equity by maintaining the financial capital (7.242), while the mean of the earning per share is greater by maintaining the financial capital (0.446) than by maintaining the physical capital (0.198).

**Table 3. Descriptive statistics for variables in the return and price model**

	Mean	StdDiv	Minimum	Median	Maximum
<i>Price model – Financial capital maintenance</i>					
<b>PRICE</b>	3.560	8.875	0.014	0.568	50.800
<b>EQUITY_FC</b>	7.242	30.987	-0.733	0.610	327.993
<b>EPS_FC</b>	0.446	1.768	-0.754	0.027	15.937
<i>Price model – Physical capital maintenance</i>					
<b>PRICE</b>	3.560	8.900	0.014	0.568	50.800
<b>EQUITY_PC</b>	8.803	37.567	-1.192	0.947	401.264
<b>EPS_PC</b>	0.198	1.534	-6.527	0.001	12.829

Definitions: PRICE - market value of equity per share at the end of the year; EQUITY\_FC - book value of equity per share by maintaining the financial capital at the end of the year; EPS\_FC - earnings per share by maintaining the financial capital at the end of the year; EQUITY\_PC - book value of equity per share by maintaining the physical capital at the end of the year; EPS\_PC - earnings per share by maintaining the physical capital at the end of the year.

Because the most variables seem to contain extreme values, we eliminated the variables which value deviate from their mean value by more than two times the standard deviation.

### 3.4. Correlation analyses

The Pearson bivariate correlation coefficients are presented in Table 4. These results highlight the positive strong correlation between share price and

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book value of equity or earnings by maintaining the financial capital. In addition, by maintaining the physical capital, there is a positive strong correlation between share price and equity, on the one hand, and a positive correlation between share and earnings, on the other hand. Regarding the correlation between specific variables, this is stronger by maintaining the financial capital than by maintaining the physical capital. Because book value of equity and earnings per share are basic variables of the price model by maintaining the financial capital, it is impossible to eliminate any of them.

**Table 4. Pearson correlation coefficients**

	<b>PRICE</b>	<b>EQUITY_FC</b>	<b>EPS_FC</b>
<i>Return model</i>			
<b>PRICE</b>	1.000		
<b>EQUITY_FC</b>	0.544	1.000	
<b>EPS_FC</b>	0.675	0.708	1.000
	<b>PRICE</b>	<b>EQUITY_PC</b>	<b>EPS_PC</b>
<i>Price model</i>			
<b>PRICE</b>	1.000		
<b>EQUITY_PC</b>	0.555	1.000	
<b>EPS_PC</b>	0.371	0.447	1.000

Definitions: PRICE - market value of equity per share at the end of the year; EQUITY\_FC - book value of equity per share by maintaining the financial capital at the end of the year; EPS\_FC - earnings per share by maintaining the financial capital at the end of the year; EQUITY\_PC - book value of equity per share by maintaining the physical capital at the end of the year; EPS\_PC - earnings per share by maintaining the physical capital at the end of the year.

### 3.5. Data analyses

Estimating the price models for the pooled cross-section and time-series sample by maintaining the financial capital and physical capital, we present in the Table 5 the slope coefficients, the related t-statistics in parentheses, adjusted  $R^2$  and significant F. According to the F-test, price model by maintaining the financial capital as well as by maintaining the physical capital is highly significant. As expected, the price model by maintaining the financial capital produces better results because the investors take decisions on the information presented in the financial statement established by maintaining the financial capital and not the physical capital. The results show that the value of equity is very important by maintaining the physical capital (the coefficient for equity is positive and significant at  $\beta < 0.01$ ). In contrast, the coefficient for earnings is significant at  $\alpha < 0.05$  only when the company maintain the financial capital, and not when the company maintain the physical capital. On the one hand, this can be explain by the fact that by maintaining the physical capital, only the simple fact that the company has profit signifies that the company's activity is stable and company has the possibility to continue its activity. On the other hand, the small number of data can be the reason for which the earnings by maintaining the physical capital have not

passed the significance test. For the whole period, the adjusted R-square explains about 26.9% for financial capital, and about 17.4% for physical capital.

**Table 5. Coefficient analyses**

<i>Financial capital: <math>PRICE_{t,i} = \alpha_0 + \alpha_1 EQUITY\_FC_{t,i} + \alpha_2 EPS\_FC_{t,i} + \varepsilon_{t,i}</math></i>					
Year	N	EQUITY_FC	EPS_FC	Adjusted R2	Significant F
All years	165	0.342 (6.314)***	1.371 (2.258)**	0.269	0.000
2005	42	0.621 (4.478)***	0.196 (0.245)	0.378	0.000
2006	40	0.488 (2.440)**	0.861 (0.458)	0.162	0.014
2007	40	0.919 (7.746)***	3.558 (2.512)**	0.691	0.000
2008	43	0.182 (5.073)***	0.253 (0.347)	0.407	0.000
<i>Physical capital: <math>PRICE_{t,i} = \beta_0 + \beta_1 EQUITY\_PC_{t,i} + \beta_2 EPS\_PC_{t,i} + \varepsilon_{t,i}</math></i>					
Year	N	EQUITY_PC	EPS_PC	Adjusted R2	Significant F
All years	164	0.279 (5.637)***	0.905 (1.465)	0.174	0.000
2005	41	0.570 (4.501)***	0.857 (1.056)	0.362	0.000
2006	40	0.498 (2.457)**	2.412 (1.353)	0.120	0.035
2007	40	1.034 (8.081)***	5.229 (3.158)***	0.619	0.000
2008	43	0.140 (4.162)***	0.098 (0.140)	0.306	0.000
Definitions: PRICE - market value of equity per share at the end of the year; EQUITY_FC - book value of equity per share by maintaining the financial capital at the end of the year; EPS_FC - earnings per share by maintaining the financial capital at the end of the year; EQUITY_PC - book value of equity per share by maintaining the physical capital at the end of the year; EPS_PC - earnings per share by maintaining the physical capital at the end of the year. *, **, *** statistically significant at 0.10, 0.05, and 0.01, respectively.					

The year-by-year regressions further support the fact that the equity is significant for investors by maintaining the financial capital as by maintaining the physical capital ( $\alpha, \beta < 0.01$  for all the years, except for 2006 year when  $\alpha, \beta < 0.05$ ). Regarding the earnings coefficients, even if they fail the significance test for all the years, they affect share price more than equity affects share price. Analysing 2007 year, it can see that earnings affects the share price more than the equity does, on the one hand, and earnings by maintaining physical capital influences share price more than earnings by maintaining financial capital do. This suggests that physical capital maintenance concept is important in explaining share price, on the one hand, and the maintenance of physical capital is superior to the maintenance of financial capital for industrial sector, on the other hand.

### CONCLUSIONS

In an economic environment that is characterized by the continuous increase in prices, by the financial capital maintenance which involves recognizing increase prices as profit, the company is unable to maintain its operating capability. Because nowadays the business environment is characterized by a continuing increase in

## Measuring the Company's Real Performance by Physical Capital Maintenance

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prices, the calculation of the profit by financial capital maintenance might have devastating consequences on the company. Thus, if the profit is distributed as dividends (which is common in business practice), the company cannot be self-financing, which leads to the bankruptcy of the company, if it will not have the ability to obtain additional sources of funding. It is therefore necessary to maintain the physical capital in determining the company's profit, due to its many advantages:

- ✓ It measures the real profit of the company even in an economic environment that is characterized by steady price increases. Unlike financial capital, which in terms of price increases calculates false profits by recognizing price increases as profit, physical capital allows the recognition of profit only after the company has maintained its operating capability;
- ✓ It provides the assurance that the company has the ability to continue its activity and provides the certainty that the company has maintained its operating capability;
- ✓ It helps to determine the dividend policy by establishing the distributable profit which represents the maximum amount of cash that may be distributed to shareholders without reducing the operating capability of the company;
- ✓ It leads to the increase of equity and thus to the increase of the value of the company. As long as any holding gain is directly recognized in equity, the value of the company increases from year to year with any increase in the value of fixed assets used in the operating activity of the company as well as with the increase of the current cost of the company's inventories;
- ✓ It is easy to be applied if the management team decides to do it. By establishing fixed assets which constantly support the production process and their evaluation at new replacement cost, as well as by evaluating inventories at the current cost, the physical capital maintenance could be possible either by an effective application in the accounting practice or as a management tool if the management team decides to apply it. This means that any gain from price growth of the assets necessary to conduct operational activities of the company is not recognized as profit, but as non-distributed reserves, recognised in equity, in order to maintain the company's ability to replace assets at their current cost.
- ✓ It avoids the risk of paying tax for "loss". In terms of price growth, if the company makes profit by maintaining the financial capital, it has to pay income tax even if the operating capability of the company declined. However, by maintaining the physical capital, the company will pay income tax only if the operating capability increased.
- ✓ It helps in establishing prices. By knowing the current cost of the inventories, the sale prices may be established in relation to current cost and not to historical cost, which leads to maintain the profitability rate of the company.
- ✓ It encourages more the company's interest than the shareholders' interest. By maintaining the physical capital, dividends distributed to shareholders decrease, but the financial resources of the company increase.

The capital maintenance concepts are used to determine companies' performance. The profit calculated by maintaining the physical capital is the only one that measures the real performance of the company. In this article we create a model based on physical capital maintenance which measures the real performance of the company in order to obtain better information for investors. Using the model created by authors, the profit was calculated for all production companies listed on the Bucharest Stock Exchange. The results of the study revealed significant variations of the profit by physical capital maintenance as opposed to financial capital maintenance. Profit recognition by physical capital maintenance provides the certainty that the company has maintained its operating capability and also that it has obtained a surplus of resources which, once distributed as dividends, even totally, does not lead to the decrease of the operating capability. In this study was showed that almost 50% of the production companies listed on BSE did not maintain their operating capability. These companies, although they were in position to reduce the operating capability, were paying income tax, or otherwise de-capitalization tax, further accentuating the decline of the company.

Physical capital maintenance helps to determine the dividend policy by calculating the distributable income. This is the maximum amount of cash that may be distributed without reducing the operating capability of the company. For almost 30% of the production companies, the profit by financial capital maintenance, following the restatement of financial statements, has changed into loss by physical capital maintenance. If the result obtained by physical capital maintenance is a loss, this situation indicates to the company's management the amount by which operating capability declined during the year, determining it to react in the following year (by increasing the operating capability of the company in order to obtain enough profit to cover the loss from the previous year).

In our opinion, the concept of physical capital can and has to be applied for the following reasons: firstly because this concept allows to obtain the real performance and business continuity; secondly because the advantages to maintain the physical capital must be known by the investors.

#### REFERENCES

- [1]Agrawal, S.P.(1977), *Accounting for the Impact of Inflation on a Business Enterprise*. *The Accounting Review*, 52(4): 789-809;
- [2]Alexander, D., Britton, A., Jorissen, A.(2007), *International Financial Reporting and Analysis*. London: Thomson Learning Edition;
- [3]Barth, M.E., Beaver, W.H., Landman, W.(2001), *The Relevance of the Value Relevance Literature for Financial Accounting Standard Setting: Another View*. *Journal of Accounting and Economics*. 31: 77-104;
- [4]Collins, D., Maydew, E. and Weiss, I.(1997), *Changes in the Value-relevance of Earnings and Book Values over the Past Forty Years*. *Journal of Accounting and Economics*. 24: 39-67;
- [5]Edwards, E.O., Bell, P.W.(1961), *The Theory and Measurement of Business Income*; Berkeley: University of California Press;

- [6] Feltham, J. and Ohlson, J.A. (1995), *Valuation and Clean Surplus Accounting for Operating and Financial Activities*. *Contemporary Accounting Research*. (Spring) 11: 689–731;
- [7] Francis, J. and Schipper, K. (1999), *Have Financial Statements Lost their Relevance?* *Journal of Accounting Research*. 37: 319–352;
- [8] Gynther R.S. (1970), *Capital Maintenance, Price Changes and Profit Determination*. *The Accounting Review*, 45(4): 712-730;
- [9] Hayek von, F.A. (1935), *The Maintenance of Capital*. *Economica*, August: 241-276;
- [10] Holthausen, R.W. and Watts, R.L. (2001), *The Relevance of the Value-Relevance Literature for Financial Accounting Standard Setting*. *Journal of Accounting and Economics*. 31: 3–75;
- [11] IASB, (2013), *Standarde Internațională de Raportare Financiară* [International Financial Reporting Standards], Translation, Bucharest: CECCAR Press;
- [12] Jianu, I., Jianu, I., Ileanu B.V., Nedelcu M.V., Herteliu C. (2014), *The Value Relevance of Financial Reporting in Romania*. *Economic Computation and Economic Cybernetics Studies and Research*, 48(4): 167-182;
- [13] Ohlson, J.A. (2009), *Accounting Data and Value: The Basic Results*. *Contemporary Accounting Research*. 26(1): 231 -259;
- [14] Ohlson, J.A. (2005), *On Accounting-Based Valuation Formulae*. *Review of Accounting Studies*. 10: 323–347;
- [15] Ohlson, J.A. (2001), *Earnings, Book Values and Dividends in Equity Valuation: An Empirical Perspective*. *Contemporary Accounting Research*, 18(1): 107-120;
- [16] Ohlson, J.A. (1999), *Earnings, Book Values, and Dividends in a Stewardship Setting with Moral Hazard*. *Contemporary Accounting Research*, 16(3): 525-540;
- [17] Ohlson, J.A. (1995), *Earnings, Book Values, and Dividends in Security Valuation*. *Contemporary Accounting Research*. 11: 161–182;
- [18] Ohlson, J.A. and Juettner-Nauroth, B.E. (2005), *Expected EPS and EPS Growth as Determinants of Value*. *Review of Accounting Studies*, 10: 349–365;
- [19] Revsine L. (1981), *A Capital Maintenance Approach to Income Measurement*. *The Accounting Review*, LVI(2): 383-389;
- [20] Riahi-Belkaoui, A. (2004), *Accounting Theory*; USA : Thomson Press;
- [21] Sandilands Committee (1975), *Inflation Accounting: Report of the Inflation Accounting Committee under the Chairmanship of F.E.P. Sandilands*;
- [22] *Securities and Exchange Commission (1976)*, *Staff Accounting Bulletin 7*;
- [23] Sterling, R.R., Lemke, K.W. (1981), *Maintenance of Capital: Financial versus Physical*, USA: Scholars Book Co.;
- [24] Sweeney, H.W. (1988), *Capital*. *The Accounting Review*, VIII(8): 185-199;
- [25] Sweeney, H.W. (1980), *Maintenance of the Capital*; *The Accounting Review*, V(4): 277-287.

## ANNEX 1

n – year

IndexS – specific annual index of prices in the sector in which the entity operates

IndexA – specific average index of prices in the sector in which the entity operates

IndexQ – quarter index in which stocks were purchased

### 1. Intangible Assets

Calculation of the *Intangible Assets Adjustments (IAA)*

$$IAA_n = RIA_n - IA_n$$

$$RIA_n = RIA_{n-1} * IndexS_n + (IAI_n - DII_n) * \frac{IndexS_n}{IndexA_n} - (IAO_n - DIO_n) * \frac{IndexA_n}{IndexS_{n-1}}$$

Where: RIA – restated intangible assets at net value<sup>3</sup>; IA – intangible assets from balance sheet; IAI – intangible assets inputs at input value; IAO – intangible assets outputs at input value; DII – depreciation of intangible inputs; DIO – accumulated depreciation of intangible outputs

### 2. Tangible Assets

Calculation of the *Tangible Assets Adjustments (TAA)*

$$TAA_n = RTA_n - TA_n$$

$$RTA_n = RTA_{n-1} * IndexS_n + (TAI_n - DTI_n) * \frac{IndexS_n}{IndexA_n} - (TAO_n - DTO_n) * \frac{IndexA_n}{IndexS_{n-1}}$$

Where: RTA – restated tangible assets at net value<sup>4</sup>; TA – tangible assets from balance sheet; TAI – tangible assets inputs at input value; TAO – tangible assets outputs at input value; DTI – depreciation of tangible inputs; DTO – accumulated depreciation of tangible outputs

### 3. Inventories

Calculation of the *Stock Adjustments (SA)*

$$SA_n = RStock_n - Stock_n$$

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<sup>3</sup>For the year 2004, the restated intangible assets are equal to the value in the balance sheet of the year 2004.

<sup>4</sup>For the year 2004, the restated tangible assets are equal to the value in the balance sheet of the year 2004.

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$$RStock_n = Stock_n * \frac{IndexS_n}{IndexQ}$$

Where: RStock – restated value of stocks; Stock – balance sheet value of stocks

To determine the quarter in which the stocks were purchased, should be followed the next steps:

a) Calculation of inventory turn

$$Inventory\ turn_n = \frac{Turnover_n / (1 + \%Margin\ of\ profit_n)}{Stock_n}$$

b) Calculation of duration of inventories storage in months

$$Duration\ of\ inventory\ storage_n = \frac{12\ months}{Inventory\ turn_n}$$

c) Determination of the quarter in which inventories from storage were purchased

$$Month = 12 - Duration\ of\ inventory\ storage_n$$

Month  $\in$  (0; 3]  $\Rightarrow$  First quarter; Month  $\in$  (3; 6]  $\Rightarrow$  Second quarter; Month  $\in$  (6; 9]  $\Rightarrow$  Third quarter; Month  $\in$  (9; 12]  $\Rightarrow$  Fourth quarter

### 4. Monetary Working Capital

$$MWC = Receivables + Cash\ and\ cash\ equivalents - Current\ liabilities$$

Calculation of the *Monetary Working Capital Adjustments (MWCA)*

$$MWCA_n = \frac{MWC_{n-1} + MWC_n}{2} * \left( \frac{IndexS_n}{IndexA_n} - 1 \right)$$

### 5. Non Current Liabilities

Calculation of the *Non-current Liabilities Adjustments (NLA)*

$$If\ NL_n < NL_{n-1}$$

$$NLA_n = \left[ NL_n * \left( \frac{IndexS_n}{IndexS_{n-1}} - 1 \right) - (NL_n - NL_{n-1}) * \left( \frac{IndexA_n}{IndexS_{n-1}} - 1 \right) \right] * \left( 1 - \% \frac{Financial\ Assets_n}{Total\ Assets_n} \right)$$

If  $NL_n > NL_{n-1}$

$$NLA_n = \left[ NL_{n-1} * \left( \frac{IndexS_n}{IndexS_{n-1}} - 1 \right) + (NL_n - NL_{n-1}) * \left( \frac{IndexS_n}{IndexA_n} - 1 \right) \right] * \left( 1 - \% \frac{Financial\ Assets_n}{Total\ Assets_n} \right)$$

Where: NL – non current liabilities from the balance sheet

### 6. Operating Expenses

Calculation of the *Operating Expenses Adjustments (OEA)*

$$OEA_n = OE_n * \left( \frac{IndexS_n}{IndexA_n} - 1 \right)$$

Where: OE – operating expenses from the profit and loss account

### 7. Depreciation Expenses

Calculation of the *Depreciation Expenses Adjustments (DEA)*

$$DEA_n = DE_n * \left( \frac{RIA_{n-1} + RTA_{n-1}}{IA_{n-1} + TA_{n-1}} - 1 \right)$$

Where: DE – depreciation expenses from the profit and loss account

### 8. Profit by maintaining the physical capital

Calculation of the *Profit by maintaining the physical capital (Profit<sub>PC</sub>)*

$$Profit_{PC} = Profit_{FC} - / (+) MWCA_n - OEA_n + NLA_n$$

Where: Profit<sub>FC</sub> – profit by maintaining the financial capital

### 9. Physical Capital

Calculation of the *Physical Capital (PC)*

$$PC_n = Financial\ Capital_n + TMPCA_n$$

$$TMPCA_n = IAA_n + TAA_n + SA_n + / (-) MWCA_n + OEA_n - NLA_n$$

Where: TMPCA – total maintenance physical capital adjustments

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ANNEX 2

1. Recognition of the **Intangible Assets Adjustments (IAA)**

$$\text{Intangible Assets}_n = \text{Intangible Assets Adjustments}_n \quad IAA_n$$

2. Recognition of the **Tangible Assets Adjustments (TAA)**

$$\text{Tangible Assets}_n = \text{Tangible Assets Adjustments}_n \quad TAA_n$$

3. Recognition of the **Stock Adjustments (SA)**

$$\text{Stock}_n = \text{Stock Adjustments}_n \quad SA_n$$

4. Recognition of the **Monetary Working Capital Adjustments (MWCA)**

If  $MWC > 0$

$$\text{Expenses with Maintenance of Physical Capital}_n = \text{Monetary Working Capital Adjustment}_n \quad MWCA_n$$

If  $MWC < 0$

$$\text{Monetary Working Capital Adjustment}_n = \text{Revenus with Maintenance of Physical Capital}_n \quad MWCA_n$$

5. Recognition of the **Non-current Liabilities Adjustments (NLA)**

$$\text{Non-current Liabilities Adjustments}_n = \text{Revenus with Maintenance of Physical Capital}_n \quad NLA_n$$

6. Recognition of the **Operating Expenses Adjustments (OEA)**

$$\text{Expenses with Maintenance of Physical Capital}_n = \text{Operating Expenses Adjustments}_n \quad OEA_n$$

7. Recognition of the **Depreciation Expenses Adjustments (DEA)**

$$\text{Expenses with Maintenance of Physical Capital}_n = \text{Depreciation Expenses Adjustments}_n \quad DEA_n$$