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FINANCIAL EFFICIENCY IN AGRICULTURE. THE ESSENCE, MEASUREMENT AND PERSPECTIVES

Abstract

Financial efficiency is one of the basic categories used to describe the state, functioning and development possibilities of various types of organizations. The essence of the financial efficiency, content and tools evolve constantly.

The same goes for agriculture. Although this sector still observes the domination of classic accounting measures and ratios, describing past accomplishments not linked to market appraisal, new concepts arise gradually, which suite the contemporary conditions of farming as well as the goals and expectations of farmers themselves. The above induces the implementation of financial efficiency measurement patterns based on economic profit and cash flows. Such patterns feature reference to the process of value creation, thus treating farms as financial investment and subjects of investment decisions.

Efficiency is one of the basic categories used to describe the state, functioning and development possibilities of various types of organizations, especially economic ones. A variety of definitions of efficiency and criteria for its classification may be found however in theoretical and empirical research. This situation makes it difficult to compare the achieved results and to formulate the objective recommendations for the economic and enterprise management policy.

On the other hand, there is no perfect method (system) of efficiency measurement and evaluation as well as identification of the factors determining it. Neither is such a method expected to be invented in the near future. Therefore, the researchers will still apply the methods from the area of classical financial analysis, which are the tools for describing the financial efficiency, as well as

the methodology initiated by M.J. Farrell in 1957, which allows for the measurement of economic efficiency by the adoption of either parametric or non-parametric approach. The fact that in the literature on the subject the classical financial ratios and measures are less often found than the Farrell method, does not mean that they should be ignored and disqualified beforehand.

This is so, since:

1. All methods of technical, allocative and economic efficiency measurement give no information about the profitability of the whole farms, not to mention the particular activities [9]. On the grounds of the broadly understood economic balance, there are no doubts that only efficient farms and agricultural enterprises can maintain their presence in the market in the long run. But the efficiency and profitability can differ in the short term or under the conditions of the state intervention. Thus, the situation when the inefficient enterprises can be profitable when subsidised extensively is conceivable. On the other hand, if the analysis is carried out according to a territorial approach and with the aim to determine the international competitiveness, the efficient agricultural enterprises at local level can turn out to be totally unprofitable at global or regional levels.
2. The classical efficiency ratio analysis may undoubtedly be justified by the fact that it is still one of the key tools of enterprises' progress evaluation within the scope of maximizing their value, which is now the basic aim of their functioning.
3. There are proposals to deliver a "joined up" approach to the profitability of sale and technical efficiency, which create new evaluation and classification possibilities and are the basis for the interesting recommendations to be taken advantage of in practice.

The basic aim of the article is to present the nature of financial efficiency, the range of its meaningful application and the newest tendencies within the scope of measurement methodology. The structure of the contents of this article is thus subjected to this aim.

The essence of financial efficiency

It is very difficult to find the definition of the above term both in Polish and in the foreign literature. In the literature on the subject, by most of these authors who use mainly the methods of traditional financial analysis, the financial efficiency means various types of profitability, which is rather obvious from the context. Undoubtedly, the profitability ratios are very popular efficiency measures, mainly because of the simplicity of their construction and interpretation. Nevertheless, they have numerous weaknesses and limitations:

- they are the bookkeeping measures, which are shaped by the accounting policy, sometimes even deliberately manipulated;
- they concentrate on the past, and – due to including the category of profit in their formula – they narrow down the area of analysis of factors influencing the achievement of monetary aims of organisations to the sphere of operating activities;

- they do not consider risk, the dividend policy of an enterprise, changes in exchange rates in the length of time and the investment inputs. All these factors, together with the accounting policy, can lead to the overestimation of the rates of return;
- they do not take into account the influence of structure and full capital cost [3,11].

In the Polish literature the profitability very often means the economic efficiency or the efficiency of functioning of an organisation. Such thinking is inappropriate in the light of the contemporary knowledge. The interchangeable use of the terms profitability and economic efficiency is not also justified according to the present tendencies in enterprise finance. This mainly concerns the concept of enterprise value management or Value Based Management (VBM) presented for the first time in the mid-1980s, intensively developed and extended later. One element that remains unchanged in this concept is the assumption that the basic objective of a contemporary enterprise is the maximisation of its value. This aim integrates all the areas and the remaining aims as well as partial strategies in an enterprise. The hierarchy of aims created in this way is presented in Fig. 1. Their measurement should be conducted systematically and include financial and non-financial tools referring to both the strategic and operating levels. This article contains only the financial measurement at the operating level. It is worth mentioning that the maximisation of enterprise value does not contradict the aim of maximising income nor does it lead to the decrease in profits of the remaining stakeholders. An important issue, on the other hand, is the fact that the measurement of the effectiveness of achieving monetary and non-monetary aims should be integrated with the chain of value creation in a company.

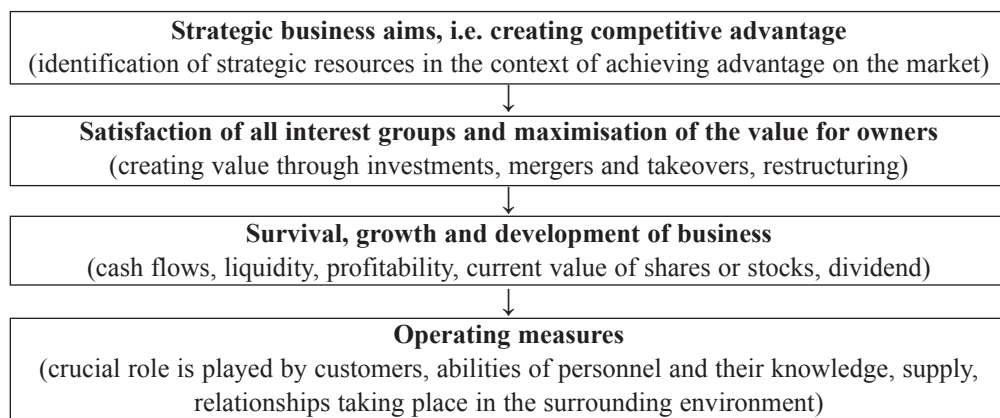


Fig. 1. The hierarchy of aims of a contemporary enterprise

Source: [18].

In the VBM concept, the form of value has to be explicitly determined and an owner of the enterprise needs to be identified. As far as the value category is concerned, there are various forms of describing it – either in terms of motives

for having it, including usefulness, or by determining the value level. Nevertheless, each time it has to be established whether it is the value in the continuation or the liquidation approach. Of course, for the purposes of this article, the former is of importance, so it is assumed that the evaluated economic entity will continue to operate in the foreseeable future. Moreover, the value is also examined in the following terms:

- in the context of investment,
- in the bookkeeping approach [6].

The latter approach can be treated only as a point of reference to the former one which assumes that the enterprise value represents the sum of the currently discounted future incomes reduced by liabilities.

As to the identification of the enterprise owner – who should potentially be interested in increasing its value – in the case of natural personality the owner is simultaneously the manager of the enterprise. This simplifies the management structure and the motivation system, but on the other hand makes the enterprise valuation market methods rather useless in practice. However, it does not mean that the enterprises owned by natural persons, i.e. most agricultural holdings in the world, are to resign from the VBM concept. This recommendation obviously relates to commercial farms. As all other entities referring to the management through value, they also should take into account that the value creation process happens when the return on the whole capital employed exceeds its costs. The four possible cases of shaping the value are presented in Fig. 2, the only quarter where the wealth of the owners increases in real terms is shadowed.

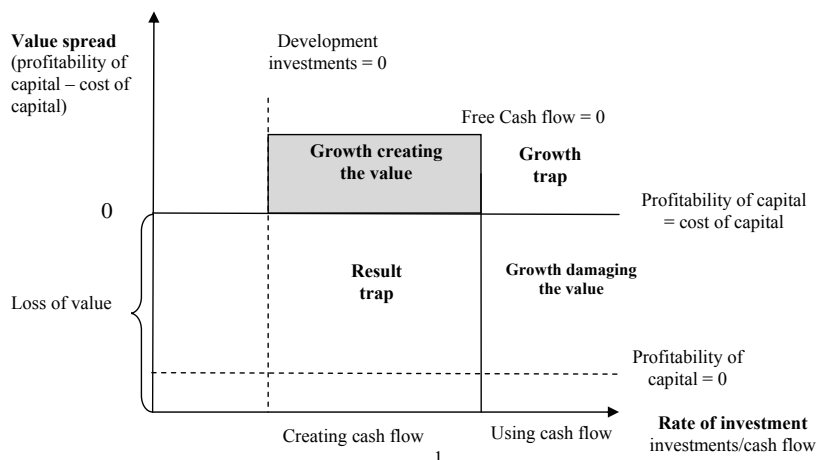


Fig. 2. The system of aims in managing the value

Source: [6].

An interesting view on the contemporary understanding of financial efficiency is represented by E.A. Helfert. According to the author, the basic economic aim of the rational management is “(...) the management of selected resources at the strategic level in such a way which in time creates the economic value, ensuring not only the coverage, but also a decent return on incurred outlays, at the same time not exceeding the level of risk accepted by the owners” [13]. This definition obviously differs considerably from the definition of traditionally understood profitability.

Taking into account the contemporary conditions of enterprises' operation, the following definition of financial efficiency of an enterprise is proposed. It is the assumed (most often by the owners) level of realisation of monetary aims of an enterprise, expressed in absolute figures (profit, income etc.) as well as in relative values, namely ratios, with the special focus on maximising its value, usually reflected in the maximisation of profits from the equity capital employed in assets.

Measurement of financial efficiency

The evolution of philosophy and methods of measuring the financial efficiency, against the background of the concept of value management, is presented in Table 1.

When analysing, it is clearly visible that the key issue in the financial efficiency measurement system now is to determine the cost of the whole employed capital, i.e. external capital as well as equity. Moreover, the measurement system has to contain measures (absolute values) and ratios, and on the whole has to be subject to an adequate evaluation of the level of achievement of a company's basic financial aim (the growth of its value). It is also recommended that the measurement should cover both previous and prospective aspects. Some of the measures and ratios can constitute a linkage between the operating and strategic levels in the enterprise. The measurement system in the schematic representation should be thus integrated in a way presented in Fig. 3.

The measurement system, presented in Fig. 3, definitely prefers the measures and ratios based on cash flows, but they still have some shortcomings, the following ones in particular:

- most hitherto proposals have been prepared by firms of consultants, which advertised them very strongly, sometimes even setting short-term trends;
- when examining more closely, it turns out that many concepts advertised as “brand new” were generally known much earlier, but under other names;
- a considerable majority of currently used tools serves only the purpose of measuring short-term achievements, so they do not help to explain much as far as determinants of value creation are concerned, which process is of an especially long-term nature;
- the fact that an enterprise or any enterprises improved their efficiency and competitiveness as well as increased their value after implementing a given measurement concept, does not automatically mean that it was just the concept which caused positive changes [7, 18].

The weaknesses of measurements based on cash flows, nevertheless, seem to be quite obvious, taking into account that it is rather impossible to create a comprehensive system of measurement of enterprises' performance and financial efficiency, which would reflect their peculiarities as well as a variety and complexity of the mechanisms of shaping this efficiency and creating the value. The conclusion that different measures and ratios ought to be used for different aims is therefore true.

Table 1

**Historical representation of financial efficiency measurement methods
and the nature of an enterprise value**

20th century				The beginning of 21st century
1920s	1970s	1980s	1990s	
<ul style="list-style-type: none"> • DuPont model of profitability measures correlation • Return on assets (<i>ROA</i>) • Return on invested capital (<i>ROIC</i>) 	<ul style="list-style-type: none"> • Earnings per share (<i>EPS</i>) 	<ul style="list-style-type: none"> • Market value to book value (<i>MV/BV</i>) or Tobin's <i>Q</i> ratio in other words • Return on equity (<i>ROE</i>) • Free cash flows (<i>FCF</i>) 	<ul style="list-style-type: none"> • Economic profit (Economic value added (<i>EVA</i>TM)) • Market value added (<i>MVA</i>) • Cash flow return on investment (<i>CFROI</i>) and cash value added (<i>CVA</i>) • Total shareholder return (<i>TSR</i>) • Shareholder value added (<i>SVA</i>) • Balanced scorecard (<i>BSC</i>) 	<ul style="list-style-type: none"> • Value creation index (<i>VCI</i>) • Intellectual capital measures (e.g. Value added intellectual capital <i>VAIC</i>)
Value measurement based on financial and accounting categories		Value measurement based on financial and accounting as well as market and cash categories	Value measurement based on financial and non-financial market categories and cash categories	Value measurement based on non-financial categories

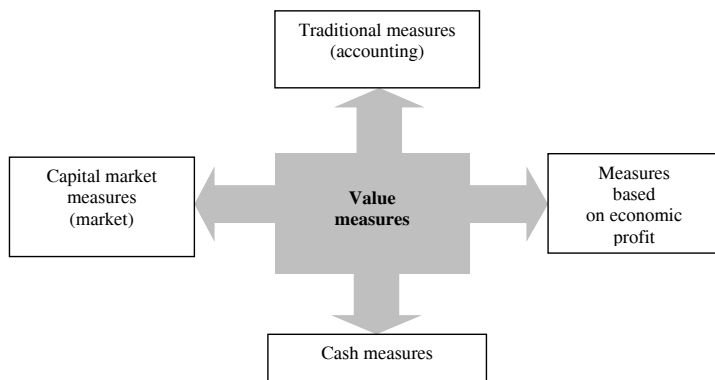


Fig. 3. Financial efficiency measurement system oriented at the creation of enterprise value
Source: [11].

The accounting ratios of financial efficiency have predominated not only in agriculture so far. The following types of ratios are used:

1. Profitability:

$$\frac{\text{Output (revenue)}}{\text{Costs}}$$

2. Profitability of production factors:

$$\frac{\text{Income (profit)}}{\text{Production factor or Total production factors}}$$

3. Profitability of inputs:

$$\frac{\text{Income (profit)}}{\text{Input or Total inputs}}$$

4. Profitability of expense:

$$\frac{\text{Income (profit)}}{\text{Expense}}$$

A numerator and a denominator in the above formulas can be determined for different levels of data aggregation, starting from single production processes and finishing at the level of agriculture of a given country or even the group of countries. The scope of the output and input taken into account can be different too. That is why there are both partial and full (aggregate, main) ratios. In the former ones, the effect relates to the particular resources, inputs or costs. Such

an approach leads to simplification and suggests cautious interpretation. Therefore these ratios are regarded as auxiliary [23]. In 2006-2008, IAFE-NRI carried out research on the economic efficiency of enterprises which were established on the land formerly belonging to the state-owned farms [1,2]. The four ratios presented below were used to determine the financial efficiency of these enterprises.

I. General profitability

$$\frac{\text{Total revenue}}{\text{Total costs}} \times 100$$

Total revenue is the sum of sales revenue, the equalised remaining operating revenue and the financial revenue. Total costs include the costs of operating activity, the remaining operating costs and the financial costs.

II. Sale profitability

$$\frac{\text{Sales revenues}}{\text{Operating costs}} \times 100$$

III. Return on equity capital

$$\frac{\text{Net profit/loss}}{\text{Mean equity capital}} \times 100$$

IV. Value added ratio

$$\frac{\text{Value added}}{\text{Total revenues}} \times 100$$

where: value added is the sum of: net profit or loss, depreciation, taxes and charges included into operating costs, interests, rents, remunerations together with social security contributions and other allowances for employees and compulsory charges on financial result.

In the abovementioned IAFE-NRI research, the economic value added (EVA) category was also used. It is an intermediate measure between measures based on the operating profit and the cash measures presented in Fig. 3.

EVA is well adjusted to the value management system since it compares the achieved operating financial result with total cost of employed capital in an enterprise, namely equity and external capital. The formal way of calculating *EVA* can be expressed as follows:

$$EVA = NOPAT - (WACC * IC)$$

where:

NOPAT – operating profit after taxation,

WACC – weighted average cost of capital,

IC – invested capital (the total assets reduced by the current liabilities).

Strict application of that formula requires many corrections to the operating profit. In practice, however, many attempts to simplify the procedure are made.

The most complex problem in estimating *EVA* ratio consists in determining the weighted average cost of capital *WACC*. The equation below is here the starting point:

$$WACC = W_e K_e + W_d K_d$$

where:

W_e – equity share in financing assets,

K_e – cost of equity,

W_d – share of debt in financing assets,

K_d – cost of debt.

There are no serious difficulties in determining the cost of external capital in agriculture. It was assumed in the IAFE-NRI research that it would be the quotient of financial costs and current liabilities. The real challenge, on the other hand, consists in determining the cost of equity, since in agriculture practically all over the world there are entities not quoted on capital markets. Despite this fact, in this sector too, the best way is to refer to the approach established for public companies. This method was applied in the IAFE-NRI research.

Estimating the cost of equity was based on:

1. Using the Capital Asset Pricing Model (CAPM), this can be put as follows:

$$K_e = R_f + \beta_e (R_m - R_f)$$

where:

K_e – cost of equity,

R_f – risk-free rate of return (assuming the interest rate on 52-week national savings certificates),

R_m – expected rate of return of the market portfolio,

β_e – equity beta factor.

β_e can be estimated, for example, on the basis of the quotient below:

$$\beta = \frac{\text{cov}(i, m)}{\delta_m^2}$$

where:

$\text{cov}(i, m)$ – covariance between rate of return of i^{th} company and rate of return of the market portfolio,

δ_m^2 – variance of the rate of return of the market portfolio.

2. Regarding $(R_m - R_f)$ as the so-called market risk premium – MRP. It was assumed that it would amount to 5% since such a value is usually accepted by broking houses and firms of auditors in Poland for the valuation of enterprises.
3. Correcting the beta factor. It consisted in calculating the following quotient:

$$WK_\beta = \frac{\delta_r}{\delta_s}$$

where:

WK_β – beta correcting index,

δ_s – standard deviation of the financial result of operating activity to operating income for agricultural enterprises,

δ_r – standard deviation of the financial result of operating activity to operating income for enterprises creating the Warsaw Stock Index–food (WIG-Food).

When adopting this three-stage procedure, three kinds of *EVA* could be determined:

- classic (based on the operating result),
- cash (operating result increased by depreciation),
- standardised (*EVA* established in a classic way was related to own and leased assets and reduced by current liabilities).

The established cost of equity (K_e) can be compared with the return on equity (*ROE*). This leads us to the following quotient:

$$VCI = \frac{ROE}{K_e}$$

where:

VCI – Value Creation Index [18].

The process of new value creation will take place provided that *ROE* is higher than K_e , which has already been presented in Fig. 2. It is worth noting that *VCI* can be easily included into a more widely known scheme of DuPont analysis of factors influencing the return on equity. *VCI* will then obviously be at the top of the pyramid.

The standardised *EVA* value can also be referred to the return on total assets (*ROA*). The condition of the creation of a new value is in this case also higher level of *ROA* than standardised *EVA*.

In more advanced applications of *EVA*, the so-called generators of its creation can be used, which are placed on the so-called value tree [10]. The following transformation of the classic *EVA* formula can be used for modelling and simulations:

$$EVA = \left[\frac{NOPAT}{IC} - WACC \right] IC$$

Four fundamental strategies for maximising the *EVA* result can be established on its basis:

1. The improvement in the rate of return on invested capital.
2. Lowering the cost of capital (the change of capital structure, application of financial gearing).
3. Investing in capital until the rate of return exceeds the cost of capital.
4. Liquidating (withdrawing) of the capital when its rate of return is lower than its cost.

In terms of cash measures of financial efficiency, the Cash Value Added (CVA) has already been briefly described. It can be generally determined in two ways:

1. $CVA = [\text{income before taxation and interest payment} \times (1 - \text{tax rate}) + \text{depreciation}] - \text{weighted average cost of capital} \times \text{gross assets};$
2. $CVA = (\text{cash rate of return} - \text{weighted average cost of capital}) \times \text{gross assets} [4].$

When making the more in-depth analysis, it turns out that CVA is not purely a cash measure since it contains accrued items (e.g. liabilities) and investments not always completed, and the product of weighted average cost of capital and total assets is not of a cash nature in financial flow terms. It is also a historical measure, while a company's value is mainly determined by future cash flows.

Having the amount of cash value added settled, it may be relatively easy to move to other cash measures of financial efficiency. Two categories based on free cash flows should be enumerated first of all.

1. Available to owners (FCFE – Free Cash Flows to Equity);
2. Directed to all investors (FCFF – Free Cash Flows to the Firm).

In both above categories, free cash flows should be understood as amounts remaining in an enterprise after covering all operating costs and investment expenditure.

When calculating FCFE amount, it should also be differentiated whether the entity is non-indebted or indebted one. In the first case the calculation formula can be as follows:

- net operating profit after tax (NOPAT)
- (+) depreciation
- (=) operating financing surplus
- (–) investment expenditure on increasing fixed assets
- (–) increase (+) decrease in net working capital.

For indebted enterprises we have:

- operating financing surplus
- (–) investment expenditure on increasing fixed assets
- (–) payment (+) growth of debt burdened with interests
- (–) growth (+) payment of net working capital [6, 11, 14].

Free cash flows to the firm (FCFF) can also be determined after calculating FCFE. It is the cash surplus after taxation but without deducting the payments connected with debt servicing and potential withdrawal of a part of equity. In other words, we have the following calculating formula:

$FCFF = FCFE + \text{interests} (1 - \text{income tax rate}) + (\text{increase}) - (\text{decrease})$ of interest-bearing debt state.

There is also another method to establish free cash flows to the firm, namely:
 $FCFF = (\text{gross financial result} + \text{interest}) \times (1 - \text{income tax rate}) + \text{depreciation} - \text{expenditure on new fixed assets} - \text{increasing of working capital}.$

Because of the lack of income tax in our agriculture in practice, the calculating formulas presented above are much simpler in this sector.

Both FCFE and FCFF are in absolute values, which means they can be meaningfully compared only in the case of a particular entity. They cannot be used, however, to inter-company comparisons. It is their undeniable shortcoming. Both flows can be either positive or negative. In the first case the value of an enterprise increases, in the second one, it decreases. This information is important in itself. In the case of indebted entities, FCFF is always higher than FCFE. Both categories are obviously equal for the companies financed only from equity.

The classic financial analysis includes some financial efficiency ratios based on cash flows. Most often they are of four types:

- Cash flow return on sales:

$$\frac{\text{Net cash flow from operations}}{\text{Sales revenues}}$$

- Cash flow ROA:

$$\frac{\text{Net cash flow from operations}}{\text{Average total assets}}$$

- Cash flow return on equity:

$$\frac{\text{Net cash flow from operations}}{\text{Average equity}}$$

- Cash quality of sales ratio:

$$\frac{\text{Sales receipts}}{\text{Sales revenues}}$$

The above ratios are regarded as tools supporting the traditional profitability analysis, enriching it with cash (financial) aspects [16,21,22,24].

New concepts

An important issue in an enterprise's economy and finance is to determine its financial growth potential. This potential is generally determined by the balanced growth rate. It informs about the possibility of financing sales without the necessity to increase the number of shareholders (stockholders), to change the

operating policy (return on sales), assets turnover, capital structure (relation of debt to equity) or dividend rate. However, an enterprise that increases the sale at a higher pace than the balanced growth rate can suffer from lack of cash. Otherwise, its surplus can appear. Various steps should be taken in both situations in order not to distort the process of creating value for owners [12].

There are several formulas for calculating the balanced growth rate, where different measures and financial ratios are used, but the equity growth rate (g) is applied most often. The simplest formula is then as follows:

$$g = ROE$$

so the growth rate is here the return on equity. However, it does not happen very often that the whole earned net profit remains in an enterprise. We thus have the next formula:

$$g = bROE$$

where:

b – retained income rate (retained profit to net profit).

Taking into account all of the factors influencing the equity growth, we come to the final formula, also referred to as the full balanced growth rate:

$$g = (1 - \text{div}) \times [ROIC \times (1 - T) + (ROIC - i_D) \times (1 - T) D / E]$$

where:

div – dividend rate (dividend/net profit),

D – external capital burdened with interest,

E – equity,

i_D – average interest rate on external capital,

T – income tax rate [11, 13].

Barry and Escalante (2002) present, on the other hand, the following full formula of growth of equity balanced capital in agricultural holdings and enterprises:

$$\bar{g} = \left[\bar{r} \left(\frac{A}{E} \right) - i \left(\frac{D}{E} \right) \right] k, \text{ where } k = (1 - t)(1 - c)$$

where:

\bar{g} – expected growth rate,

\bar{r} – expected return on total assets,

i – average interest on external capital,

A – total assets,

E – equity,

D – external capital,

t – average income tax rate,

c – average income withdrawal rate for consumption, payment of dividend and other non-agricultural purposes [8].

When the remaining factors are constant, the above formula leads us to the conclusion that:

- (1) if the financial gearing (D/E) increases and/or the difference (margin) between the return on assets (r) and the interest on external capital (i) grows, the equity growth rate increases and in reverse;
- (2) the growth of share of a consumed part of income or profit (c) and/or financial result tax rate (t) leads to the decrease in equity growth rate and in reverse;
- (3) under the static analysis, rising the financial gearing (level of indebtedness) is justified until the expected marginal assets profitability is higher than marginal external capital cost.

In the context of the above interrelations, it should be underlined that the maximising of the equity growth rate should not be regarded as a top priority. The aim should rather be to optimise the growth and the state of this capital, its continuous adjustment to the real needs. This capital also has its price, which is often forgotten, and which has already been presented when discussing the economic value added.

When the cash value added was described it was also mentioned that one of the two methods of determining it is by using cash flow return on investment (CFROI). It is worth adding that this concerns the calculating of internal rate of return on the cash surplus derived from the assets employed and the current operating activity. Therefore, this category joins in itself the cash flows achieved from the capital invested, which then returned, as well as from operating receipts.

There are some formulas of determining CFROI, but the one presented below is used most often:

$$GI = \sum_{n=1}^i \frac{GCF_n}{(1 + CFROI)^n} + \frac{RV}{(1 + CFROI)^n}$$

where:

GI – gross investments (net assets reduced by current liabilities and increased by depreciation, then multiplied by cumulated inflation in the n period);

GCF_n – gross cash flow (depreciation plus financial result after tax on sales, increased by non-operating income, and reduced by non-operating costs);

RV – final value (residual) of owned assets (cumulated by means of the inflation rate in the n period the value of assets not subject to depreciation, e.g. land, financial assets, stock, debts, etc.) [20].

CFROI can also be determined in the following way:

$$CFROI = \frac{(GCF - \text{economic depreciation})}{GI}$$

where the economic depreciation then equals:

$$\frac{PV_{RC} \times WACC}{(1 + WACC)^n - 1}$$

where:

PV_{RC} – current value of the replacement cost of assets which is the difference between gross investment (GI) and their final value (RV),

$WACC$ – weighted average cost of capital.

If we know the last mentioned category it will enable us to provide the general rule of economic and financial capability of an enterprise. It is of a two-element character:

1. $CFROI > WACC$ – a company is capable (efficient) and multiplies its value.
2. $CFROI < WACC$ – the depreciation of an enterprise's value takes place because of the incapability (inefficiency) [11].

Helfert (2004) and Damodaran (2002) enumerate three CFROI advantages with relation to the classic profitability rates:

- (1) CFROI only indirectly refers to financial statements, which is to historical bookkeeping data, but it mainly concentrates on the future cash flows.
- (2) Cash flow rate of return puts all the assets being in use in their beginning value, which is the amount incurred for their creation or acquisition, while the traditional profitability ratios generally rely on net assets, i.e. gross assets less depreciation and possible corrections due to a permanent loss of their value. Moreover, thinking in the convention of overall funds spent is common among entrepreneurs-investors.
- (3) CFROI reflects well the long-term effects of the investment and operating activity of enterprises, in which fixed assets dominate, and it is a structural feature of, inter alia, agricultural holdings and enterprises. The classic bookkeeping ratios reflect mainly, on the other hand, the short-term efficiency.

Basing on the internal rate of return concept, so also the CFROI category, and using Rappaport's [19] concept of value creation for stockholders, Peyerl and Breuer [17] proposed a four-step model for determining the financial profitability of family holdings. It is the tool for strategic management in principle, for which the classic profitability ratios cannot be applied since:

- the value of fixed assets determined by them on the basis of historical calculation values usually differs more or less from the market value;
- they are mainly focused on tax returns and connected with the protection of creditors, instead of cash flows and value creation;
- they are oriented in the first place at the evaluation of the past events and neither the analyses of time series nor the forecasts made on their basis allow for the elimination of this fault;
- treating sunk costs as capital costs in calculations is debatable because investment is of a cyclical character in agriculture, thus it has to take into account future events;
- from the financial point of view, the separation of the operations concerning a farmer's household and the ones of his production holding is not advisable. Each withdrawal of cash for private aims changes the financial structure of the whole holding, and therefore increases the need for the external capital.

Then this is reflected in the profit and loss account and in tax returns. The quantification of cash flows concerning both kinds of activity in a joint account will be even necessary if its aim is to determine the value of the whole holding and the process of its increasing. Otherwise the discount rates, the rates of internal return and the rates of cash return will not be estimated properly;

- they do not take into account changes in the exchange rates of currencies in time.

The final formula of Peyerle and Breuer's model can be expressed as follows:

$$-Av_0 - BV_0 + \sum_{t=0}^T \frac{(PV_t - ST_t - AK_t)}{(1+r)^t} + \frac{(AV_t + BV_t)}{(1+r)^T} = 0$$

where:

AK – value of labour inputs,

AV – own fixed assets without land, at market price,

BV – value of own land at market price,

PV – private consumption,

r – internal rate of return,

ST – income tax,

$T = 0, 1, 2, \dots T$ – period of planning in years.

The calculation of the internal rate of return (r) from the above formula informs us of the financial profitability in the form of cash flow rate of return.

Generally, even the calculation of classic profitability ratios in family holdings creates many problems. The source of them lies in general in using the resources which do not have the market value. This concerns especially the manual and supervision work as well as the remuneration for management, but it is also not easy to determine the value of land and the remaining assets.

To determine the classic profitability in family holdings, the so called residual income approach is generally adopted, which is based on residual income [15]. It consists in the deduction of calculated remuneration of manual work and management from total income derived from the total employed production factors. In the case of total assets (together with land), owned and leased, the profitability is given by:

$$\frac{RETASETS}{AVFASSETS} \times 100$$

where:

$RETASETS$ – net agricultural income increased by lease rent and interest, and then reduced by conventionally set remuneration of manual and managerial work.

$AVFASSETS$ – average value of total assets.

The approach based on the residual income has a number of faults. Firstly, it assumes the existence of permanent economies of scale and competitive inputs and product markets. Secondly, it assumes implicitly that all inputs are of variable character. Thirdly, it is assumed that the manual and managerial labour inputs are remunerated on the basis of its marginal productivity. However, if there appears one quasi-constant input at least (land, machines, even a part of labour resources) then the factor remuneration rule in accordance with their marginal productivity will be broken. In consequence, also all the imbalances in agriculture have to find their reflection in the distorted value of assets and their profitability.

Moss et al. [15] propose another approach – imputed value approach, i.e. calculation of the value, which is rooted in the neoclassical economy, and it relates especially to the alternative costs category, thus also to market valuations of production factors. Definitely, it is to overcome the drawbacks of residual income. Its nature can be explained in the simplest way again by presenting the formula for calculating the total assets profitability:

$$\frac{IRFAST}{AVFASSETS} \times 100$$

where:

IRFAST is the sum of the product of land value (the market value most preferably) and the share of lease rent in it and the product of value (the market value, as before) of the remaining assets and the profitability of risk-free financial assets (treasury bonds and national savings certificates).

The profitability of assets calculated in this way is assumed to reflect the alternative cost of capital investments in an agricultural holding.

The consistent application of the imputed returns approach requires that also the other quasi-constant factors, including work, be valued at their alternative costs. It is difficult in practice since the assumed amounts of wages of hired workers lead to underestimation of the real level of human capital in agriculture in this case. Also it should be taken into account that the prices of assets in agriculture are under the growing impact of the factors from the outside. Generally, under this approach, if the alternative cost of the only one factor is set incorrectly, the profitability measures of the remaining ones will be inaccurate. On the other hand, this method seems to be better developed towards the objective measurement of profitability, mainly due to its reference to the category of alternative costs.

Not surprisingly therefore, the profitability of total assets determined by means of both methods varies greatly, which is shown in Table 2. In the distinguished subperiods, the profitability established in accordance with the *imputed approach* was always higher than in the *residual approach*, sometimes even two times. It has serious consequences for the financial intervention in agriculture, the profitability of agricultural investments and the potential investors' interest in agriculture. Generally, it can undermine the common belief that the profitability of agriculture is very low, and therefore this sector has to be permanently supported from the budget.

Table 2

Profitability of total assets in the U.S. agriculture in 1940-2003 (%)

Years	Dominating event	Residual Approach	Imputed Approach
1940-48	World War II	5.98	6.89
1949-59	postwar boom	3.01	5.99
1964-73	Vietnam War, the growing agricultural export	3.57	7.38
1979-84	debt crisis in agriculture	2.09	6.55
1985-95	recovery after the crisis	3.59	5.62
1996-02	Federal Agriculture Improvement and Reform Act of 1996	2.28	4.90
2002-03	Farm Security and Rural Investment Act of 2002	1.45	3.55

Source: [15].

Conclusions

The essence and measurement of the financial efficiency in agriculture are still evolving. The classic bookkeeping ratios and measures based on historical data are still in common use, but in principle they are quite irrelevant to market valuation. Their unquestionable advantages are: the simplicity of construction and the relative easiness in interpretation, even intuitive. On the other hand, the bookkeeping measures and ratios have a number of weaknesses. Therefore, there is a search for concepts and tools, which are better adjusted to the contemporary conditions of economic activity as well as the aims and expectancies of entrepreneurs. As a result, the financial efficiency categories based on the economic profit and cash flows emerged. They indicate the efficiency of value creation for the owners of enterprises, so they treat an enterprise also as a kind of financial investment and a subject of investment decisions.

Despite the fact that the family holdings, which often do not conduct systematic accounting, predominate in agriculture there are also holdings and enterprises in this sector which are unequivocally market-oriented. Objectively, there are no obstacles to the adoption of the concept of financial efficiency measurement with the use of the economic profit and various categories of cash flow return (profitability) also by the market-oriented agricultural holdings. It is advisable for such entities to take advantage also of e.g. the modification of the classic return on assets by adopting of the imputed approach presented in the article. The popularisation of this approach would make the politicians and researchers see the financial problems of agriculture and the justification for its permanent budgetary subsidising from a totally different perspective.

The thesis that the financial efficiency is one of the equally important components of the economic efficiency measurement is true in broader context. It provides us with many other possibilities to evaluate the performance of economic

entities, which cannot be achieved by the parametric or non-parametric methods. Thus, the problem lies in the improvement of all tools of economic efficiency measurement and the search for complementary relations so as to prevent the efficiency measures from being biased themselves as well as to provide recommendations for its permanent development.

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