

DETERMINING THE MARKET VALUE OF THE ENTERPRISE USING THE MODIFIED METHOD OF CAPITALIZED NET INCOMES AND METFESSEL ALLOCATION OF INPUT DATA

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Abstract: the aim of this article is to modify methods of capitalized net incomes in order to determine the market value of the enterprise; the market value is subsequently applied to a specific model case of a healthcare facility. Upon carrying out the analysis of historical economic data, the calculation of the permanently removable net income is modified. The modifications in question represent the determination of the expected annual investment efforts for a smooth running of the enterprise and a modification of labour costs according to the information portal of average earnings in a specific sector. The input data for determining the permanently removable net income are modified according to Metfessel allocation.

Keywords: method of capitalized net incomes, expected annual investment efforts, labour costs, market value, alternative costs of the equity

1 Introduction

Each evaluated enterprise has its own specifications which should be considered by the appraiser in order to correctly determine its value. This aspect requires an entirely individual approach of the appraiser when determining a value of any object to be evaluated.

What represent a specific group of enterprises to be evaluated in the Czech Republic are healthcare facilities. The specifications of these healthcare facilities in the Czech Republic are represented by combined incomes. Their clients, which mostly consists of patients, whose number represents one of the items of their combined incomes in a form of lump sum payments from health insurance from the economic point of view of healthcare facilities in the Czech Republic.

The next item of combined incomes of healthcare facilities in the Czech Republic is an income exceeding capital payments associated with defined and often extra medical operations. Last but not the least, revenues from selling medical devices constitutes an integral part of incomes. Capital payments include some of the medical operations for which the patient cannot be invoiced. These are regular check-ups, administrative operations, consultation with family members, but also removing foreign objects from the nose or the ear canal etc. Extra medical operations can either be reimbursed via commercial insurance companies that offer these services, or patients themselves pay for them. Some medical devices can also be reimbursed by health insurance companies to the full amount or as a contribution to a part of all costs of a specific medical device. However, some medical devices must only be paid by the patient. As for medical facility, a mutual relationship between the patient and physician must be considered; i.e. the physician should be deeply interested in the patient and his health.

The aim of our article is to modify methods of capitalized net incomes in order to determine the market value of a specific healthcare facility; such a modified method is then applied to model healthcare facility XYZ. The final calculation is modified so as to determine the expected annual financial efforts and labour costs. The market value of the enterprise is set to 31.1.2017. To enable a comparison, Vrbka et al. (2019) analysed the value determination in market rental for a similar type of healthcare facility.

2 Literary research

The aim of the appraiser is to assess the market value. In case the market is instable, different appraisers may achieve various

results. However, this situation is excluded if the market is stable (Shapiro et al., 2013).

Astakhov et al. (201) state that when evaluating a company, its size is considered as one of the value-creating factors. However, the authors argue that it may not be true.

First of all, the term 'market value' must be clearly defined and also its specifications in relation to other value-creating factors should be introduced. According to Krabec (2009), classics of political economics sought the value as absolute and universally valid quantity. This 'inner value' is included in any possessions and the market value thereby must, at least within a long time period, be aimed at it. Neo-classical economic theories suppose that values are determined by preferences of participants on the market. From the economic viewpoint, the value theory may be understood in terms of the price as a synonym of value (Jakoubek and Brabenec, 2012).

The International Valuation Standards (IVS) (2017) define the market value as an estimated amount for which the property should be exchanged between a consensual purchaser and a consensual seller independently from the transaction and after the relevant marketing has been carried out to the date of the evaluation; each party acts well-informed, reasonably and without distress.

Guan et al. (2009) define the market value as a complex function comprised of a wide range of factors including enterprise's capital structures, structures of the storage economy, corporate governance etc. Furthermore, he mentions that it is also an amount of investments in the research and development in new technological processes that exerts a considerable influence on the enterprise's market value.

Kumar and Shetty (2018) sought for a closer connection between the enterprises' market value and the number of environmental programmes for environmental improvement that had been consensually implemented by these enterprises. The authors concluded that the effort of companies to protect or improve the environment significantly increases its market value. Sandner and Blok (2011) argue that it is also trademarks and patents of companies that have a positive influence on companies' market value. Chen et al. (2008) used artificial neural structures (ANS) to examine the influence of the patent on the market value of pharmaceutical companies in the USA and achieved negative results. On the contrary, the neural network found out that what has a positive influence on the value of pharmaceutical companies is their technological independence.

Having fulfilled prescribed requirements, all enterprises in the Czech Republic are obliged to pay income tax. The income tax is governed by Act No. 586/1992 Sb. of 20th November 1992. The tax base is the amount by which the payer's incomes exceed expenses that were provably incurred of their reception, generation and maintenance within the taxation period, unless stipulated otherwise (Česko, 1992).

According to the payer's identification it is possible to classify the incomes of healthcare facilities into incomes collected from subjects representing the receiver of healthcare (including without limitations health and commercial insurance companies) and incomes directly collected from the receivers of healthcare. Incomes from health insurance companies may be further divided according to the dependence on the performed operation into lump-sum payments and performance payments. The amount of the lump-sum payment is in the Czech Republic annually governed by a regulation of the Ministry of Health. The amount of the lump-sum income is calculated from the number of insured persons of the respective health insurance company multiplied by the basic lump-sum rate set for one registered insured person of the respective health insurance company per

calendar month (Česko, 2018). Payments for separate performances are governed by a specific regulation. This regulation stipulates the way individual points are allocated to separate medical operations including the duration of each individual performance (Česko, 1998). The next sources of income of healthcare facilities are direct payments of patients for extra medical operations that are not covered by insurance companies and also incomes from sales of medical devices.

In order to evaluate the healthcare facility, it is necessary to evaluate all items that are declared to be operationally necessary assets of the healthcare facility. The operationally necessary assets are not only a long-term tangible property, but also operationally necessary current assets which the company uses to generate operational incomes (Řezňáková et al., 2010).

Klieštík et al., (2018) argues that the enterprise value can also be influenced by a tax shield. The value of the tax shield is usually related to the capital structure of the enterprise and its value.

The next part of the text refers to individual methods for evaluating the company. The evaluation may be based on the market, assets or income analysis (Vochozka, 2017). French and Gabrielli (2018) argue that evaluation methods and procedures employed on the market were insufficiently developed in the International Valuation Standards Council (IVSC). Even though evaluation approaches and methods and their sub-divisions have been currently devised, it is necessary to re-examine the importance of determining an effective technique for the evaluation using market methods. Šimek (2011) dealt with determining the market value in an enterprise which had declared bankrupt, which is a very common phenomenon during the economic crisis.

The principle of the property value of the enterprise (substantial value) is simple and easy to understand. The property value of the enterprise is defined as a total of individually evaluated property items from which a total of individually evaluated liabilities is subtracted (Brabenec, 2010). The size of the property value is given by the structure and the amount of property items of the enterprise (Mařík et al., 2018).

Various income-generating methods are the method of capitalized net incomes, method of discounted cash flow (DCF), method of comparing market values and combined method (Kislingarová, 2001). Furthermore, the method of capitalized net incomes will be closely analysed as one of the methods for enterprise evaluation. Kislingarová argues (2001) that the major promoter of employing the method of capitalized net incomes to determine the enterprise value was German theorist Konrad Mellerowicz. The profit capitalization is mostly based on the previous enterprise's performance. To apply this method requires fulfilling the prerequisites as follows: 1) intimate knowledge of company previous results (3-5 years); 2) applying going-concern principle; 3) the company must invest in the amount of the depreciation (amortization).

A German term for the method of capitalized net incomes is Ertragswertmethode (IDW S, 2007). Lyshchikova et al., (2016) examined the economic content, dominant characteristics, structure and the characteristics of the potential of regional resources as a cornerstone of the capitalization of the regional economy. Reuse (2007) argues that in order to evaluate banking institutions in Germany, the method of capitalized net incomes presents the only applicable method which may determine the value of this type of institutions.

Lisi (2019) combined the methods of capitalized net incomes with the hedonic model. She introduced the standard hedonic price function instead of the market value in the method of capitalized net incomes.

As for data time series what needs to be considered is that they are under the influence of the temporal factor. In such a case the data are processed by some of the statistical methods for determining the average data (Valášková et al., 2018). Yip et al.,

(2012) declare that by means of weighted average data it is possible to reduce the average error of the resulting prediction under specific conditions. However, this can rarely be employed and only on condition that economic empirical data sets are to be dealt with.

For that purpose Neitola and Rahkonen (2010) created an algorithm by which a large number of data may be generalized. This algorithm is applicable to any kind of analysed data.

The next applicable type of average in economic data is a moving average. By means of the moving average it is possible to smooth out price series of shares. Raudys and Pabarskaite (2018) devised their own optimized moving average to smooth out time series of supplies.

Arithmetic and geometric mean belongs to basic statistical quantities. These basic statistical quantities are established on a linear and logarithmic combination. Breuer et al., (2014) explored whether either arithmetic or geometric mean is more applicable to assess the discount rate for the enterprise evaluation by means of bootstrap toolkit. According to his results, arithmetic mean is the best tool to determine the discount rate for the enterprise evaluation.

The evaluation of the enterprise has been analysed using different methods by a lot of authors. Wilimovska and Krzysztozek (2013) used ANS for making a prediction of a future enterprise value.

Jiang and Cui (2013) observed a specific annual periodicity in the amounts of incomes from dataset of companies from the identical sector. Having used the algorithm that describes this annual periodicity, they devised a method of making a prediction of the income at the end of a specific period by interpreting reliable data. By means of input data from the beginning of the period, the result is adapted to the current situation on the market.

An entirely different point of view of the enterprise evaluation is presented by Berzkalne and Zelgave (2014). They argue that the enterprise value can also be determined on the grounds of its 'intellectual property'; i.e. the 'know how' of the enterprise and its employees.

Krabec (2014) declares that different evaluation standards such as the Institution of Public Auditors (IDW), the International Valuation Standards (IVS) or the European Valuation Standards (EVS) provide the appraiser with a reliable manual on rules that protect him from the unnecessary risk of an inadequate assessment.

In regard to evaluation standards, there are two broad categories of values (market and no-market). The market value presents a neutral approach to market subjects. On the other hand, no-market value requires knowledge of the supplying party and demanding party, their subjective preferences regarding future business plans (Krabec, 2007).

3 Materials and methods

Healthcare facility XYZ provided its historical economic data for purposes of this article. It is economic data from 2012-2016 that were analysed. First of all, an analysis of all provided historical economic data will be carried out. The analysis will decide whether model healthcare facility XYZ is in the phase of business growth or in another phase of stabilization with respect to its life cycle. What will also be analysed is whether model healthcare facility XYZ will be able to apply 'going concern' principle. As a result, a convenient method of determining the market value of the enterprise will be employed to evaluate model healthcare facility XYZ. In order to determine the market value of healthcare facility XYZ, the method of capitalized net incomes will be applied. The evaluation will be carried out using operation No.1.

Operation No. 1: determining the market value of the enterprise using the method of capitalized net incomes

$$HP = \frac{T\check{C}V}{i_k} \quad (1)$$

Where: HP – enterprise value,
TČV – permanently removable net income,
 i_k – calculated interest rate.

At first, permanently removable net incomes must be determined according to historical economic data on the rate of incomes, expenses, labour costs and tax liability of model healthcare facility XYZ.

The difference between incomes and expenses will provide the economic result, which enables the calculation of the tax liability. The rate of the income tax of legal entities to the date of the evaluation is set to 19% in the Czech Republic. The difference between the economic result and tax liability will provide the economic result after the taxation. This result allows the calculation of permanently removable net incomes.

When calculating the permanent removable net income, several modifications must be carried out. The first modification consists in determining the expected annual financial costs of the smooth operation of the whole facility. For that reason, model healthcare facility was provided with a list of all operationally necessary assets. The correction of labour costs will be the second modification of the calculation. These modifications will be more carefully analysed in separate chapters. Vochozka (2016) used ANS to determine the enterprise's costs.

In order to correctly determine the overall permanently removable net income, a data correction from individual years will be made by allocating weights to separate years. The weight allocation to values of individual years will be carried out according to Metfessel allocation. Since the market value of the enterprise is determined to the date which on the imaginary timeline follows the date to which the last input data are available, the input data will have to be manipulated via individual weights. In regard to the nature of evaluated model healthcare facility XYZ, the weights from the previous years will be negligible; on the other hand, the closer the data are to the date of evaluation, the greater weights will be chosen.

The last step to determine the market value via the method of capitalized net incomes is determining the calculated interest rate. In the event of model healthcare facility XYZ the calculated interest rate presents alternative costs of the equity (r_e). This ratio and the possibilities of its application are in-detail analysed by Vochozka and Rousek (2011). In order to determine the alternative costs of the equity, a build-up method will be applied. The input data for calculation r_e come from the data of the Czech National Bank (ČNB) and the data published on Aswatha Damodarana websites of a professor of finance at Stern School of Business in New York. The calculation of the alternative costs of the equity itself results from identifying possible risks for model healthcare facility XYZ and the follow-up total of several component risk surcharges and the rate of risk-free incomes of long-term government bonds. The calculation of the alternative costs of the equity will be carried out according to operation No. 2.

$$r_e = r_f + r_{pod} + r_{spec} \quad (2)$$

Where: r_e – alternative costs of the equity,
 r_f – risk-free income,
 r_{pod} – risk surcharge for the business risk
 r_{spec} – Specific risk surcharge

Determining expected annual investment efforts. The first of the mentioned modifications when calculating the permanently removable net income is to determine the expected investment efforts of the smooth operation of model healthcare facility XYZ. The expected investment efforts are to build up annual

financial reserves for future investments in new operationally necessary assets when life cycle of the current equipment has ended. According to the list of the operationally necessary assets, an estimated purchase price of the new operationally necessary assets will be assessed.

The operationally necessary assets of healthcare facility XYZ equal to 26 items. These are: office furniture, an office chair, a chair for a patient, a fridge, an examination couch, an optotype, a physician's mercury tonometer, a physician's watch tonometer, a PC, a printer, a monitor, a shredder, a CD recorder, a telephone, an air cleaner, camera monitoring system, electronic security signalling, a conference chair, vertical venetian blinds, shadow roller blinds, a register, a cabinet with a sink, an electric heater, a lamp, a backup power supply and aquamat.

All these items will be supplied with their estimated life cycle in regard to their basic nature. The ratio of their expected purchase price and estimated life cycle will determine the expected investment costs of all the items from the operationally necessary assets. The total of the expected investments in renewing all items of the operationally necessary assets will determine the overall expected annual investment efforts to renewing the operationally necessary assets of model healthcare facility XYZ.

Wage correction

The second of these modifications in determining continuously removable net income will be the correction of labour costs. First, an analysis of the current level of labour costs will be made and it will be decided whether the reported labour costs include the labour costs of all XYZ employees, ie whether these costs are achievable by the new investor / business owner. For this purpose, the reported wage costs will be compared with the median gross wages according to the information system on average earnings (ISPV) published annually by the Ministry of Labor and Social Affairs.

Table 1 contains information on the median gross wage at full time from the years 2012-2016 from the category of employees 2212 Doctors specialists according to ISPV.

Tab. 1: the median gross wage in the category 2212 Doctors specialists from the years 2012-2016

Year	Median gross wage (full time)
2012	41,759 Kč
2013	40,040 Kč
2014	41,709 Kč
2015	47,066 Kč
2016	48,134 Kč

Source: ISPV

Table 1 shows that the median gross wage in category 2212 Physicians Specialists has steadily increased over the years. By multiplying the median gross wage according to the ISPV by the number of months in the year (12), we obtain the adjusted amount of annual wage costs of the model healthcare facility XYZ. If the reported wage costs do not include wage costs for all employees, the data on the median gross wage according to ISPV will be used for the calculation.

4 Results

Based on an analysis of the historical economic data of the model healthcare facility XYZ from 2012-2016, it was found that the model healthcare facility XYZ has already exceeded the growth stage in terms of the company's life cycle and is now in the stabilization phase. Along with this, it can also be stated that the model healthcare facility fulfills the "going concern" prerequisites. Based on these facts, the method of capitalization of net incomes was chosen for the valuation of the model healthcare facility XYZ.

Permanently removable net incomes were also determined on the basis of historical economic data of the XYZ model healthcare

facility from previous years. The first modification for the calculation of permanently removable net incomes was the determination of the expected annual investment efforts for the smooth running of the model XYZ healthcare facility. Table 2 shows the inventory of all operationally necessary assets with the expected future purchase price of the new item, the service life in years and the calculated expected annual investment efforts.

Tab. 2: List of operationally necessary assets of model healthcare facility XYZ with expected future purchase price of a new item, the service life in years and expected annual investment efforts

Item (number of pieces)	Expected purchase price of a new piece (CZK)	Expected service life (in years)	Expected annual investment efforts (CZK)
Office furniture (5 pcs)	22,600	15	1,506.67
Office chairs (2pcs)	11,300	4	2825
Chairs for the patient (2pcs)	4,520	10	452
Fridge (1pc)	6,215	6	1,035.83
Examination couch (2pcs)	14,690	10	1,469
Optotype	3,390	15	226
Physician's mercury tonometer(2pcs)	3,390	10	339
Physician's watch tonometer(1pc)	1,695	10	169.5
PC (2pcs)	27,120	4	6,780
Printer (3pcs)	30,510	6	5,085
Monitor (2pcs)	11,300	4	2,825
Shredder (1pc)	5,650	6	41.67
CD recorder (1pc)	2,260	4	565
Telephone (2pcs)	2,260	6	376.67
Air Cleaner (2pcs)	6,780	6	1,130
camera monitoring system (1pc)	16,950	15	1,130
electronic security signalling (1 pc)	28,250	15	1,883.33
Conference chairs (13 pcs)	9,040	15	602.67
vertical venetial blinds	33,900	20	1,695
shadow roller blinds (1 pc)	2,260	20	113
Register (3 pcs)	6,780	10	678
Cabinet with a sink (1 pc)	4,520	15	301.33
Electric heater (2 pcs)	1,130	6	188.33
Lamp (2 pcs)	1,130	5	226
Backup power (2 pcs)	5,650	5	1,130
Aquamat (1 pc)	1,130	10	113
Total	262,160		33,787

Source: Own

Table 2 shows that the total expected annual investment efforts for the smooth operation of the model XYZ healthcare facility is CZK 33,787. This total expected annual investment efforts will be taken into account in all years of provided economic data used to calculate net removable income.

When comparing the wage costs according to historical economic data of the model healthcare facility XYZ, it was found that the amount of reported wage costs is lower than the median gross wage with full time GP according to ISPV.

Therefore, a second modification of the calculation of continuously removable net income was adopted. The second modification of the calculation of continuously removable net income was the correction of labour costs according to data from the ISPV.

Furthermore, the analysis of historical economic data of the XYZ model healthcare facility showed that the reported wage costs did not take into account the wage of a practicing physician who had been practicing in the XYZ healthcare facility at full time from 2012-2014 and then part time (80%) in 2015 and 2016, but only the nurse's labour costs. These circumstances were also duly taken into account and the resulting calculation of labour costs for the XYZ model healthcare facility was adjusted accordingly for 2015 and 2016. Both the first and second modifications to the calculation of profit after tax are reflected in Table 3.

Tab. 3: Calculation of economic results after tax after the application of the first and second modification (in CZK)

Year	2012	2013	2014	2015	2016
Revenues	1,739,655	1,820,509	1,595,020	1,499,263	1,491,085
Expenditure	845,555	854,972	808,284	847,213	977,262
Wages	385,984	403,153	438,129	490,846	542,099
Median GW according to ISPV	47,066	47,066	47,066	47,066	48,134
80% of GW	-	-	-	37,653	38,507
100% of GW per year	564,792	564,792	564,792	451,834	462,082
Investment intensity	33,787	33,787	33,787	33,787	33,787
economic result	295,521	366,958	188,157	166,430	17,954
Tax	56,149	69,722	35,750	31,622	3,411
economic result after taxation	239,372	297,236	152,407	134,808	14,543

Source: Own

Based on the modifications made, the economic results after taxation of the model healthcare facility XYZ for the years 2012-2016 were determined. The expected investment intensity and median gross wage according to ISPV were taken into account as wage costs. For 2015 and 2016, the median gross wages according to ISPV were adjusted to 80% according to the amount of the GP's workload.

The next step was to assign the individual weights to the economic results after taxation based on the Metfessel allocation. The resulting correction for the calculation of continuously removable net income is shown in Table 4.

Tab. 4: Data modification according to Metfessel allocation

Year	Economic result after taxation (CZK)	Assigned weight	Adjusted economic result after taxation (CZK)
2012	239,372.00	5	1,196,862
2013	297,236	5	1,486,180
2014	152,407	10	1,524,073
2015	134,808	20	2,696,161
2016	14,543	60	872,556
Total	838,366	100	7,775,833

Source: Own

Subsequently, the post-tax economic result was adjusted for use in the capitalized net income method. The total adjusted economic result was divided by the sum of all the weights used according to the Metfessel allocation. The sum of all weights is 100 (5 + 5 + 10 + 20 + 60 = 100). The permanently removable net incomes was then set at CZK 77,758 (7,775,833 / 100 = CZK 77,758.33) after rounding.

Subsequently, the cost of equity was determined according to Operation No. 2. According to CNB data, which stores data on the amount of long-term government bond yields, the arithmetic mean of ten-year government bond yields was determined as of the last day of each calendar month for the period from 1st

January 2014 until the stated valuation date (31st January 2017). The resulting arithmetic mean was 0.85% (CNB, 2019).

Another risk considered was the risk premium for business risk. The risk premium for business risk refers to the basic risk premium determined on the basis of the business activity of the assessed enterprise. The premium for business risk does not take into account the specificities of the enterprise under assessment. In this case, this risk merely reflects the riskiness of the industry in relation to other sectors of the economy. The level of risk premium for business risk was taken from Aswatha Damodaran's website for the Hospitals / Healthcare Facilities for European economies for 2016, which was the latest available data on the market value date of the model XYZ healthcare facility. The risk premium was chosen at 4.13% (Damodaran, 2019).

As the nature of the XYZ healthcare facility also requires that in the event of the loss of a key practitioner, the XYZ healthcare facility is completely paralyzed, it was also necessary to establish a risk premium for this specific risk. In this model case, the risk premium for the specific risk was set at 2.0%.

The resulting amount of alternative equity costs is calculated as follows (Operation No. 2):

$$\begin{aligned} r_e &= 0.85\% + 4.13\% + 2.0\% \\ r_e &= 6.98\% \end{aligned} \quad (3)$$

On the basis of the available resources, the alternative cost of equity was set at 6.98% using Operation No. 2. Finally, the market value of the XYZ model healthcare facility was determined using the capitalized net income method (Operation No. 1). The values entering the calculation represent the results of the proposed modifications in the calculation of permanently removable net income.

$$\begin{aligned} HP &= \frac{77,758 \text{ Kč}}{6.98\%} \\ HP &= 1,114,016 \text{ Kč} \end{aligned} \quad (4)$$

The market value of the model healthcare facility XYZ was determined by our modified method as of 31 January 2017 based on data from 2012-2016 to CZK 1,114,016.

5 Conclusion

In our paper a modified method of capitalized net incomes was applied in determining the market value of an enterprise. In the calculation of permanently removable net income, two modifications were made in the historical economic data of the 2012-2016 model healthcare facility XYZ. Using the proposed modifications, the economic results after taxation was reduced in the input data from all years for determining the market value of the model healthcare facility XYZ. The evidence also shows that increased expenditures in 2015 and 2016 were partly offset by lower wage costs due to only 80% engagement of the practitioner. All these factors have been taken into account when determining the market value of the XYZ model. The goal of the paper was fulfilled. It should be noted that the structure of calculations of individual economic indicators is applicable in the Czech Republic. In case of application of calculation modifications, it is necessary to follow the specifics of calculation of economic indicators of healthcare facilities of a particular country. It can be stated that in the future, when assessing the market value of an enterprise using the capitalized net income method, the valuator should not neglect the investment intensity of a smoothly running business. Increased attention should also be paid to reported labour costs. These shortcomings can be eliminated by the proposed modification of the calculation.

After modifying the input data, the market value of the model healthcare facility XYZ was determined to be CZK 1,114,016 using the method used.

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Primary Paper Section: A

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