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CLEAN SURPLUS MODEL IN EQUITY VALUATION AND FINANCIAL DATA QUALITY CONTROL

Abstract:

The article deals with the valuation of equity, in particular of shares that cannot be valued on the basis of market data. The clean surplus model is one of the models that allows the valuation of shares that are not marketable. The article presents the role of accounting and theoretical foundations, as well as the concept and assumptions of the clean surplus model. The model is related to financial research. In addition, the model can be used to confirm the reliability of the figures.

Keywords: *surplus, model, valuation, shares, cost of capital.*

JEL classification: *M41*

Paper type: *Theoretical research article*

Introduction

Business owners are interested in increasing the value of their shares in a company. The valuation of these shares is of interest to finance. The tool for this is the use of financial data accumulated in the company's information system or market data. While it has become quite common to use market data, it is less common to use internal company data, which best describe the economic reality, its internal determinants. These data are influenced by both internal and external factors and should therefore

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provide a good basis for assessing and valuing the company. Although internal financial data is only historical, and market data can include announcements, statements of intent, even financial markets are not fully informative. Therefore, valuation in models based on accounting data can be useful in reality, can provide knowledge of fundamental information about the company. The fundamental purpose of accounting is to provide as complete and transparent information as possible about the company. For this reason, accounting is subject to strict legal constraints aimed at standardisation and the production of high-quality financial data. The development of accounting and the synthesis of its achievements with those of finance provide new insights into valuation and its determinants. The purpose of this article is to present the Clean Surplus Model for valuing securities as a complement to the market-based methods commonly used in finance.

The purpose of this article is to present, discuss and demonstrate this model. It is structured in such a way as to first outline, albeit in a very simplified way, the material basis of double-entry bookkeeping and its evolution towards the surplus model. Then, using the model, the possibility of ex-ante evaluation and estimation of the cost of capital was examined, as well as the use of the model in assessing the reliability of financial information. English language literature has been used to achieve the purpose of the article.

The object of study in accounting theory

The essential feature of accounting is its close connection with economic phenomena in the enterprise and their proper estimation and presentation. As a practical occupation, it has also become an object of scientific interest. The purpose of this research has been to formalize practical relationships and to search for basic relationships and theoretical foundations. Research is still underway on the mathematical foundations of accounting, but it is also linked to the theory of finance, particularly the theory of capital². This search relates to Luca Pacioli's fundamental principle of double entry accounting.³ An area of research interest is the question of net worth, as a certain result of economic activity, which also relates to the fundamental purpose of financial management in a company. Net value is naturally associated with the residual value to which the owners are entitled, called pure surplus in the concept. This value corresponds to accounting profit, but even more clearly to economic profit.

² D.P. Elerman, 1982.

³ L. Pacioli, 1494.

Accounting, in principle, is a specific way of presenting and aggregating economic transactions, so it shows a relationship not only with regard to the simplest mathematical operations like summation, where one can check the correctness of accounting, but also shows some references to future and present value as certain financial categories and related to financial theory. The study of pure surplus (a.k.a. net worth) does not lead to the determination of accounting rules, but rather to the use of collected data to better understand the essence of accounting. The concept of clean surplus is distinguished from so-called "dirty surplus" in that only non-accidental factors affecting the surplus are pointed out. The recorded financial data in the entity's accounting form the basis for the valuation of shares, with a view to the following year and beyond. The results of these calculations have a solid basis in strict figures, which, however, are not always correct. The application of the clean surplus model can lead to two types of conclusions, as to the substance of the valuation and suspicion of the correctness of the data on the basis of which the valuation is carried out. The greatest benefit of the model is that it obtains information about the valuation of shares from internal accounting data, rather than based on market data (which, by the way, only a few companies have access to). Naturally, this valuation cannot lead to a definitive conclusion as to the correctness of the valuation, but only to a high probability of valuation and suspicion of bias in the data or confidence in the figures used.

Currently, a popular trend in the development of accounting as a scientific discipline is the use of the Fentham and Ohlson⁴ surplus model to measure net worth, which is a measure of the benefits of a business. This trend has brought research interest closer to the field of finance studies. However, this is not the first such rapprochement, as a common area of interest has been the interest in inflationary phenomena as affecting economic phenomena reflected in an entity's accounting (this has also been realized in the form of demands for accounting under conditions of high inflation and the need to index financial data). Moreover, the search for answers to the results of investments, the NPV (net present value) formula found its way into the field of finance, but also imprinted itself on the orientation of thinking and use of present value in entity accounting. "Discoveries" within accounting will enrich knowledge in finance and vice versa. Next, what role accounting plays in the activities of business entities will be presented, to then refer to the development of thought in accounting.

⁴ G.A.Ohlson, J.A. Fentham, 1995.

The role of accounting and the quality of financial data

The main role of the accounting information system is to provide unique information about the enterprise and for proper management. However, it is impossible to argue that accounting is limited to an informational role in the enterprise. In particular, these main tasks include:⁵

1. To determine tax payments,
2. Enabling managers to evaluate management performance,
3. Calculation of economic indicators showing comprehensively the results of the company's management, providing the basis for assessing financial condition,
4. Influence positively or negatively the price of shares when the company is listed on the stock exchange.
5. Influence the policy of profit distributions.

Proper accounting therefore influences decisions through the correctness of data by collecting, processing and presenting it. The fundamental issue, therefore, is the correctness of the data, which is not easy to achieve due to the linking of results to the evaluation of management effectiveness and the prediction of the effects of decisions. The latter is a very ambitious but not unreasonable approach. After all, if accounting collects information, processes it, etc., then as long as the data is reliable, it is the basis for decision-making. One of the fundamental issues is the accumulation of information with different meanings and cause-and-effect relationships. Thus, a marginal part of the data has an apparent or weak cause-and-effect relationship, but those in the relevant time horizon are random variables. The decisive picture should be formed by data that have a close cause-and-effect relationship. This is an essential premise for the correctness of the economic surplus model. The following presents the concept of a clean surplus model, where only those variables with substantive justification are distinguished, and using the implications of double entry accounting.

However, there are also reasons to believe that errors appearing in financial information may be biased or even intentional⁶. Such errors cause decision-making errors. When there are no perfect financial markets in terms of information⁷, information is particularly valuable, and the holder of such information gains advantages that he can exploit, but at the expense of other market participants. Thus, the convergence of forecast results on the basis of the surplus model may indicate a high probability of good quality data on which accounting is based. However, the discrepancy may indicate the phenomenon of manipulation of financial data.

⁵ Wolk, H.I., Dodd, J.L., & Rozycki, J.J. (2017), s. 2.

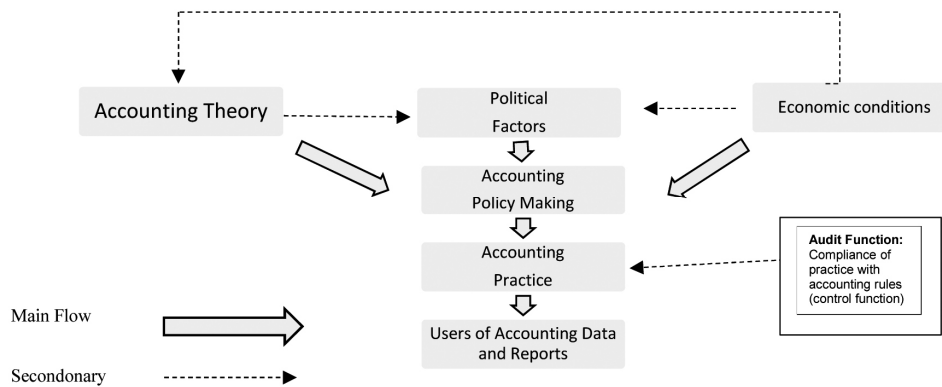
⁶ Intentional manipulations can be fraudulent.

⁷ A.Damodaran, 2017.

Theoretical basis of accounting

The theoretical search led from double entry accounting to the dirty and clean surplus model of economic accounting. Accounting as a scientific discipline is basically based on a very universal and simple equation. The concept of accounting as a very practical discipline derives from the so-called principle of double entry accounting, which is not so much a fundamental assumption of the concept, but a foundation embedded about the observation of duality of transactions. The implication is that first: the theoretical foundation was sought on the basis of accounting practice. Secondly, there are certain relations between standards and practical occupation are indirect. This is presented in the following diagram.

Figure 1. The Financial Accounting Environment

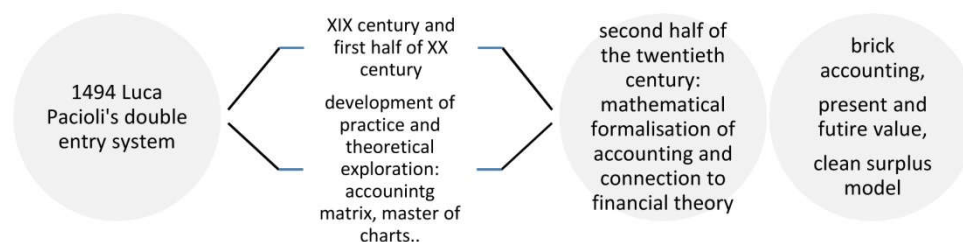


Source: Wolk, H., Dodd, J., & Rozycki, J. (2017).p.5.

Essentially, accounting theory plays the role of explaining and justifying relationships in financial statements. It was not until the second half of the twentieth century that accounting theory was merged with financial theory.⁸ Historically speaking, this combination is very recent. This is illustrated by the following diagram:

⁸ D.P. Elerman, 1985.

Figure 2. Podstawy teoretyczne rachunkowości



Source: Own elaboration based on R. Mattessich, 2005

The latest trend in research is the determination of net worth (the surplus earned after covering the costs of operations). The originals of this research appeared in Ohlson and Fentham (1995). However, before this discussion, it is necessary to trace the connections of this research to the previous ones and to uncontroversial accounting principles, in particular, the double entry principle. The following presents the principle of double entry in its strict and developed form. This is shown in the following table 1.

Table 1. Abbreviated and expanded form of L. Pacioli's double entry accounting principle.

Assets (type of assets)= total capital (property rights),
Assets= equity + liabilities,
Assets= equity+ liabilities+ net worth
Assets + expenses= equity + liabilities + income + net worth

Source. Own study

The development of the identity shown above is obvious from a purely mathematical point of view. However, the matter is not so trivial from an economic point of view. After all, there are many possibilities for the detailed formation of identity in the mathematical sense. But the issue is the economic sense of identity. After all, the accounting system is also not a legislative creation, but has a close relationship with economics. The equation is also applicable to the recording of public funds, where assets do not play an important role, such as the state budget. A certain practical shortcoming would be the application of the same principles of accounting for economic operations in a market economy entity, where the accrual principle is most relevant, and in a budget where it is not the expenses incurred that matter, but the actual ability to accumulate cash and spend it.

Hence, the cash basis should replace the accrual principle in the latter case. Substituting costs for expenditures, and revenues for receipts, a different identity can be obtained, when it is the cash basis that is essential in the accounting of governing bodies of public institutions like budgets – table 2.

Table 2. Dual balance sheet entry vs. operation of public funds

Assets+expenditures=equity+liabilities+inflows + net worth
Expenses= Receipts + net worth

Source: Own study

In this approach, however, both the concept of assets and sources of financing lose their economic sense, as they are of a different nature. If we are already talking about the budget then resources are less important than flow streams. Then the equation takes on a different universal form:

In the budget, net worth is also a key value because it determines the result of collecting and spending income. It then determines the surplus or shortfall. The development of the above identity could involve the inclusion of budget revenues and expenditures⁹. Pure surplus here, however, usually defines the negative phenomenon of deficit. The above proves how universal is the law of balance sheet equilibrium, or simply the principle of double entry accounting (the other as universal as the law of supply and demand). Since in the above equations net worth is the resultant of many financial streams without distinguishing between accidental, speculative growth and others, the above equations lead to a dirty surplus. Wanting to obtain an economically correct model, it is necessary to turn to cause-effect relationships.

It should be noted that net worth plays a key role in the equation, since without it, the identity would lose its economic sense, since the purpose of farming is to earn a profit or economic surplus, which in financial terms is also subject to economic risk. Another development of the identity can be to take into account the change in value due to acquisition and appreciation, for example in table 3.

Table 3. The most developed double entry accounting formula

Assets+ acquired assets+ expenses= equity+ liabilities+ incremental liabilities + net worth+ value of incremental financing.
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Source: Own study

⁹ Unlike expenditure and income, these represent cash flows that do not represent a definite use, but are subject to reimbursement.

Before the research on net worth, in the subsequent search of researchers in the field of accounting, there were achievements regarding the numerical relationships found between the various elements, which today can be described in the form of lines of relationships, which in English-language accounting is called in free translation: brick accounting (brick accounting). Relationships determined in this way are in the form of line functions, so they form the form of matrices, to which matrix calculus is applicable. Such presentation, however, is a very detailed notation, which, however, does not immediately have a general theoretical meaning and does not provide new properties of accounting. Examples of relationships can be in table 4.

Table 4. Universal examples of relationships between elements of financial statements.

Prior period fixed assets- depreciation+ acquired fixed assets= current period fixed assets,
Prior period cash+ Net profit+ depreciation+ other net cash flow= current period cash,
Net profit= income - expenses.

Source: Own study

In fact, more such dependencies can be found, which makes accounting very flexible. Still, the lines of dependencies are obvious from a mathematical point of view, and this adds little to the new developments in scientific discovery. In a practical sense, the dependencies are universal in nature allowing obvious errors to be caught. In cognitive terms, only the last concept seems to provide a basis for scientific inference. This is the concept of pure economic surplus. This theory allows practical application to practice, as it allows you to determine the correctness of the figures contained in the financial statements, to learn about the efficiency of management and confirm with a certain degree of certainty the reliability of financial data. This task is carried out not under certain conditions, but with a certain amount of risk.

The essence of the clean surplus model

The premise of the clean surplus model is founded on the distinction between the imperfection of accounting valuation and market value. The model refers to the concept of normal and extraordinary profits in economic theory. Extraordinary profits result from a company's market reputation, undervaluation of material rights held (trademarks, patents, results of research work) which accounting does not perfectly capture. At the same time, it corresponds to the fact that normal profits cover the owners' working time, the opportunity cost of financial decisions, hence for their determination in the model the economic cost of capital is used. With

regard to extraordinary profits, assumptions of actual profits earned that can be determined by the popular ROE and ROA (return on equity; return on assets) ratios are used. Given ROE, the valuation of shares will include the impact of leverage. The authorship of this model is attributed to Ohlson and Fentham¹⁰. Its essence is expressed in the following equations in table 5.

Table 5. Basic mathematical identities in Ohlson and Fentham's clean surplus model.

Book value of net worth (at time t)= Book value of net worth (at time t-1)+ income (up to time t)- dividends (at time t),
Market value (at time t)= Book value of net worth (at time t)+ all future residual income discounted at rate i

Source: G.A Feltham, J.A.Olhson 1995.

The idea behind this theory is to use book values to estimate future values in the financial statements, particularly the value of shares. While it is important to realize that financial results are influenced by a variety of factors, the model distinguishes between the influence of deterministic to stochastic factors. The latter are treated as deviations from the relevant trends set by the cleaned financial data; hence the model's name. Using the model, one can also achieve an estimate of the cost of capital, thus meaningful information about capital, and the differences between the estimated values of equity and its actual value are treated as the random influence of the other factors; hence the accuracy of the model should be high, since the other factors are random. Model accuracy can also be considered an essential feature of financial data quality. Higher accuracy explains the high quality of the financial data from which the values are estimated. The opposite is interpreted as high discrepancy.

The two equations relate to each other by analogy, as they have a similar structure. From 1 equation in Table 6 below, one can see purely accounting/bookkeeping relationships, in the other market relationships, which are not always available. This is also the difficulty of market-based pricing, but also the strengths of the theory. In order to properly understand the concept of pure surplus, it should be noted that there is a kind of "gap" between the values reported in the financial statements, because part of the value is recorded at historical value, part of the liabilities may not be included in the balance sheet such as lease obligations, trade secrets, the company's consumer portfolio, patents, the results of development research, i.e. elements that are financially significant and make up a unique market position or investment intentions, and this is not reflected in the financial statements. This unique market position determines the present

¹⁰ G.A Feltham, J.A.Olhson 1995.

value of future windfall profits. Both recorded values form goodwill and those that are not included in the accounting system.

Table 6. Mathematical identities in the financial surplus model when estimating surplus value.

Goodwill (t)= book value (t)+ unique residual value,
Unique residual value= sum of present value of extraordinary profits,
Sum of present value of extraordinary earnings= expected earnings - accrued discount,
Expected profits= ROE* opening book value,
Accrued discount= cost of capital * book value at opening of books.
Book value(t+1)= book value (t)*[1+(1- dividend payout ratio)*ROE].
Rate of return of the company= risk-free rate*(1-beta)+ beta*market rate of return.

Source: G.A Feltham, J.A.Olson 1995.

Note that not all data need to come from accounting data, they can be replaced by market data. The company's rate of return can also be estimated based on the arbitrage pricing model (APT), or the Gordon dividend model, or the capital asset pricing method (CAMP), but then market value data are needed. It is therefore recommended to base the return estimate on the arbitrage valuation.

Clean surplus model vs. selected valuation models in finance

The most popular method of valuing capital assets is the Capital Asset Pricing Model (CAPM) is based on financial data from the capital market, where the company's shares are priced. For this reason, the clean surplus model can be used in the absence of such market data. And yet most companies in Poland cannot value their assets in this way. Thanks to the economic surplus model, it is possible to estimate this value and relate it to the cost of capital in that company. Comparison with the most popular valuation methods, is shown in the table 7 below.

Table 7. Comparison of valuation with clean surplus model

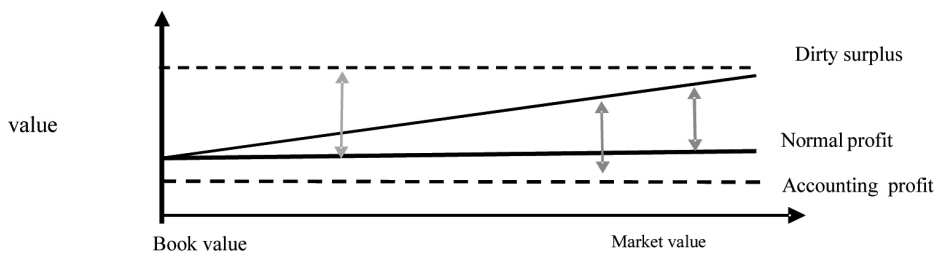
	Capital Assets Pricing Model	APT model	Clean surplus model
Use of internal financial data	No use	To a small extent	Yes
Emphasis on the calculation of the cost of capital	Fundamental matter	Fundamental matter	Minor
Extraordinary earnings	No reference	No reference	Essential issue
Verification of the accuracy of financial data	None Potentially possible	None Potentially possible	
Impact of market factors on valuation	Significant	Significant	Not Significant
Capital structure issue	Relevant to valuation	Relevant to valuation	Neutral to valuation

Source: own compilation.

The strength of the clean surplus model, in addition to its reliance on accounting data, is that it is neutral to capital structure policy. Thus, the model does not explain the impact of this factor on valuation. From the point of view of economic interpretation, the main aspect is the valuation of shares, rather than, as in other models, focusing on estimating the cost of capital.

The pure surplus that the model estimates as a result is the actual profit purged of random factors, that is, the model highlights normal profit when the book valuation reflects the market reputation valuation, which is unrealistic. And when the accounting valuation completely ignores the valuation of market reputation, the valuation in the clean surplus model tends to value the residual. The following figure shows this:

Figure 3. Profits, dirty surplus and clean surplus



Source: Own study.

It is not possible to clearly state that pure surplus will be associated with one category of profitability. It depends on the degree to which the broad issue of market reputation is included in accounting valuation. This one, in turn, is basically insignificant in Poland, except for the valuation of the surplus of assets over their fair value at acquisition. The economic surplus model, in this case, will be a useful tool for calculating this reputation and reliability of financial data.

Conclusion

The literature review carried out shows that double-entry accounting is a fundamental invention in the scientific basis of accounting. On its basis, new concepts of interdependencies emerge, although none of them has such a universal meaning, but a certain achievement is the reference to the theory of finance, as well as the formulation of numerous mathematical

identities between the elements of the financial statements, which have practical significance. These identities have a linear function and thus allow a simple economic interpretation. The clean surplus model achieves two practical goals. The first is to perform valuations of ownership interests, and the second is to provide certainty - or the opposite - about the reliability of financial data. In practice, however, it will be difficult to distinguish between the two results. On the one hand, there is the advantage that accounting firms can obtain an estimate of the value of shareholdings but on the other benefits the efficiency of financial management. It is also worth noting that the role of double entry in accounting is not only a practical accounting rule, but also has great theoretical significance and is valid in the research conducted. It is clear that research in accounting is becoming increasingly similar to research in finance.

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