“Improving methodology of estimating value of financial sector entities dealing in mergers and acquisitions”

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Improving methodology of estimating value of financial sector entities dealing in mergers and acquisitions

Abstract

The article is devoted to the topical problem of finding the most efficient method of estimating the value of financial sector entities when initiating and conducting mergers or acquisitions. The main result of such transactions is synergistic effect which enables identifying the increase of market value of financial sector entity's capital. The problem consists in developing tools for estimation: financial indicators, performance efficiency indicators, stock indexes, investment risks, risks of synergetic effect. These approaches create heterogeneity in selecting the future model of merger or acquisition. The objective of the research is to analyze the tools of making transactions and to develop the most generic and risk-free approach to achieve efficiency of corporate integration agreements.

Keywords: mergers and acquisitions**,** corporate integration, financial sector entities, globalization, market value, investment, financial market.
JEL Classification: F36, G34.

Introduction

The problems of applying corporate deals in mergers and acquisitions in international finance as well as methods and sources of financing them were of specific scientific and social interest in the 20th century. Lots of financiers consider it to be one of the most important manifestations of in the sphere of corporate management and international finance. Such processes enhanced by global competition, world markets of loans, stock markets, insurance services markets make it possible to state the leading role of such deals in ensuring movement of investments and capital.

The economic content of merger and acquisition agreements in international activities of financial sector entities (FSE) (transnational banks and non-bank institutions) can be considered as a form of corporate strategy and a type of investment. The corporate effect which is the aim of such agreements consists in the increase of capitalization (for public FSE) and the increase of business value (for private FSE) due to the synergetic effect of mergers and acquisitions. At the same time the results of such agreements from the point of view of social efficiency are not rather uniform as they lead to the reduction of real spending and change the competitive position on the financial market.

Under the present circumstances of high concentration of capital the results of FSE' activities will not be always efficient. The entities with dispersed property will be at a disadvantage by almost all the indicators of efficiency, investment and restructuring. When the level of property concentration is middle the FSE occupy leading positions in expansion of business and growth of efficiency. In such situations, this is market capitalization/business value estimation which is used to obtain an adequate characteristic of the market position, to identify the potential of growth and financial market development potential.

In case of initiating acquisition agreement, the buyer may get a good rate of financial instruments exchange with the target entity, or raise cheaper capital for the transaction relying on the value of their own business. These factors predetermine the constant search for efficient econometric models and algorithms for estimating (on the basis of the business value) the efficiency of the corporate merger and acquisition agreements implementation. Therefore, the research on corporate management in international finance is of high topicality nowadays.

1. Problem definition

The importance of the issue of corporate consolidation through mergers and acquisitions contribute to fundamental research in the field of efficient management of financial sector entities' integration. The most significant achievements in this area are presented in the works of such renowned scientists as: M. Aoki, J.C. Bakker, T.O. Davenport, P.F. Drucker, P. Gaughan, Milford B. Green, O. Harari, F. Hers, M. Jensen, L. Marks, S.F. Reed, P. Scott-Morgan, E. Donald Sorensen, Robert B. Thompson, D. Vachon. It is worth noting that modern scientific thought in the field of international corporate integrations determines their efficiency mostly through the corporate synergy, without sorting out organizational factors and components into the operating synergy as well as through financial security, FSE's capital formation, its credit potential and financial strategy.

2. Problem solution

Business value estimation is an integral part of the financial management of merger and acquisition transactions of non-public entities in the financial

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sector. Firstly, the estimation is required to keep shareholders informed of the invested capital profitability and financial stability when making the transactions. Ensuring the efficiency of the transaction (NAV > 0) requires estimation of the value of the entities being merged or acquired (Jensen, 2006). Secondly, it makes it possible to justify plans for efficient investment of the accumulated capital. Thirdly, there are opportunities for getting efficient loan capital to implement development projects. Business estimation is an important element in substantiating the target of acquisition when making a diagnosis of the transaction options, determining the efficiency of the transaction results and the process of financial sector entities integration.

For estimating the value of public entities of financial sector, the goals of profitability and development stability management consist in achieving sustainable growth of their financial instruments' rate. Managing sustainable growth of non-public entities dealing in M&A, requires the development of special elements of the financial and economic mechanism and the execution of specific procedures of business value estimation.

The need to improve the tools of business value estimation for mergers and acquisitions is also confirmed by the fact that more than 50% of mergers and acquisitions fail to increase the value for shareholders. In most cases it occurs because of the errors in the value estimates of the business to be merged in the stage of planning the transaction (Sorensen, 2008). The net added value as a result of merger or acquisition (NAV) is the main characteristic of the transaction efficiency subject to objective estimation of cash flows. NAV is formed due to changes in risk and cash flow (ΔCF_{ct}) of financial sector entity merged as compared to its initial position. Therefore, we distinguish the following peculiarities of applying the income approach to estimating the value of business in M&A transaction:

1. As for determining NAV it is reasonable to use a common method estimating finance business of the participating FSE, the restrictions for using the profit-based method significantly increase.
2. Under conditions of high uncertainty in M&A results the renunciation of taking into consideration the remaining period increases the reliability of the estimations.
3. When assessing non-public FSE by income-based methods it is necessary to take into account the restriction for the maximum low rate of return of such entities that determine the minimum value of the business. The need for this restriction is related to the motivation of profit minimization and to the acquisition of non-public FSE with really low profitability. The ratio of values estimated on the basis of the income approach and the market value of the assets determined by the capital market method without taking into account the cost of goodwill is suggested to be the above-mentioned restriction (Anslinger, 1996).
4. The need for further analysis of the expected growth rate of the merged or acquired FSE when forecasting its cash flows.

The income-based methods of estimating the value of FSE are based on predicting invariable cash flow or its monotonic growth in the remaining period. In the capitalization method the above conditions apply to the forecast and remaining periods. Cash flow growth rates vary depending on the degree of synergetic effect.

Figure 1 shows the model of cash flow changes for equity capital. It reflects the typical situation of the successful integration of FSE after merger or acquisition. Rapid growth of FSE in the first phase of the synergy implementation slows down later on. But net investment (the difference between gross investment and depreciation) decrease simultaneously. The level of risk may change as well. The synergy implementation period (the first two phases in Figure 1 can vary from six months to five years after the announcement of the agreement. If you do not take into account changes in growth rates, the value of the merged/acquired FSE can be significantly overestimated if the growth rate at the first phase is accepted and underestimated if the growth rate at the third phase is accepted.

When determining the level and forecasting the growth rate of cash flow of non-public FSE it is necessary to take into consideration: the expected changes in general economic conditions; synergetic effects of mergers and acquisitions; historical rates of business growth; the initial level of business competitiveness and management's expectations for strategic competitiveness factors and others.

In Vachon (2007) it is recommended to use the expected rate of current profit growth calculated as the product of the reinvestment coefficient (kr) and the expected return on assets (ROA) as the main indicator of non-public FSE' growth:

$$g = kr \cdot ROA. \quad (1)$$

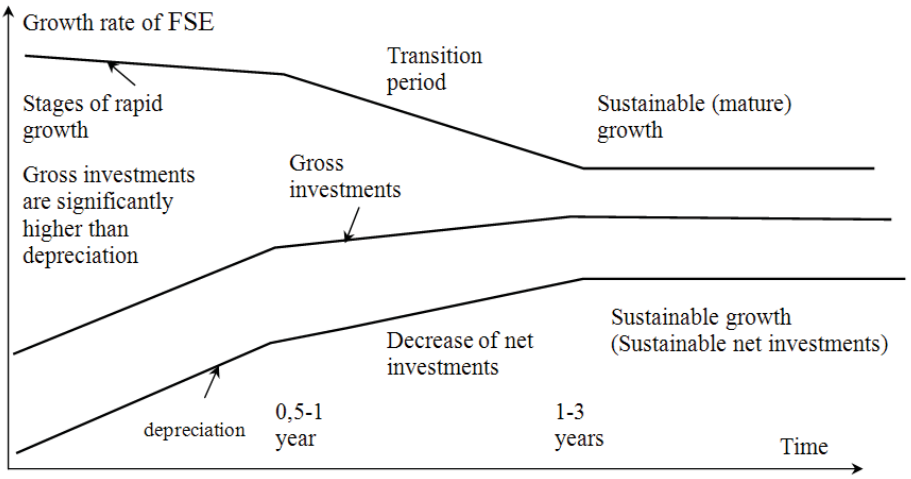

Fig. 1. Three-phase model for mergers and acquisitions of financial sector entities

The reinvestment coefficient can be determined according to the FSE' financial statements as the ratio of the growth of the fixed (*FA*) and current assets (*CA*) due to net profit and loan capital to the after-tax profit with interest on loan capital. If the return on assets in the estimation period is equal to the profitability in the base period, the expected growth will be determined only by the planned value of reinvestment.

$$kr = (\Delta FA + \Delta CA - Dep) / EBIT \cdot (1 - \tau). \quad (2)$$

If $ROA_t \neq ROA_{t-1}$,

$$kr = \frac{\Delta FA + \Delta CA - Dep}{EBIT \cdot (1 - \tau) \cdot (ROA_t / ROA_{t-1})}. \quad (3)$$

This approach to estimating the pace of business growth in the forecast period is based on the plans of investment development (expected volume and efficiency of investments).

Nowadays, little research of the effect of liquidity on business value in M&A is carried out. The research of Silber was the first attempt to create a multi-factor model of premium for liquidity (Thompson, 2010):

$$\ln(RPRS) = 4{,}33 + 0{,}036\ln(REV) - 0{,}142(RBRT) + 0{,}174\,DERN + 0{,}332\,DCUST, \quad (4)$$

where, *RPRS* is the ratio of the price of shares limited for circulation to the price of shares in free circulation = (1-discount for lack of liquidity); *REV* is the revenue of non-public entity, mln. USD; *RBRT* is the percentage of the estimated batch of shares relative to their total number; *DERN* is the characteristic of the entity profitability (*DERN* = 1 – profitable, *DERN* = 0 – loss-making); *DCUST* is the characteristic of the relationship with the investor (*DCUST* = 1 if the entity has a relationship with the investor as a client, *DCUST* = 0 – if not).

The consideration of FSE liquidity for the value and price of the business (assets) being purchased is required:

- when using the market approach and significant difference in the liquidity of business of counterpart entity and target entity. In this case the liquidity impacts possible terms and conditions of purchase and sale of businesses;
- when estimating the market value of the target entity as an operating business on the basis of the cost approach or the liquidation value of the company. The liquidity impacts the demand and consequently the price of the assets' elements;
- if the value of the target business is estimated by discounting cash flows, the impact of the acquired business liquidity will be reflected in the integrated structure's cash flows and risk predetermined by synergy.

The basic principle of taking into consideration the FSE liquidity may be the effect of liquidity on the efficient utilization of the acquired business (assets). The more efficient the acquired business can be for many buyers, the more liquid it is. As compared to public FSE all non-public FSE are illiquid. But the illiquidity level of non-public FSE vary depending on a set of characteristics of the target entity. The most important of them are the following ones:

- financial condition of FSE(*X*1). It is better to use financially stable business, including the possibility to sell it in the future;
- purpose of acquiring FSE(*X*2). As a rule, the value liquidity is lower for a strategic buyer than for a financial one. Accordingly, the discount can be less;
- liquidity of FSE' assets (EC) (*X3*). Assets structure, the technical state of certain assets influence significantly the FSE' utility for

potential buyers. The assets liquidity is directly taken into consideration in cost-based method of estimation;

- the business growth prospects depending on its reputation and the prospects of the financial market (*X*4). Significant prospects for a non-public FSE often make it more liquid than a public one;
- the size of a non-public party of M&A transaction and prospects of its transformation into a public FSE (X5) (Green, 2011; Sirower, 1997).

The investments in a non-public FSE are aimed at getting control. Therefore, the liquidity of non-public FSE' majority stake is significantly higher than the liquidity of the minority stake. Accordingly, the discount for illiquidity of minority stake should be substantially higher than for majority stake (*X*6). There is also premium for control.

Thus, the following approach to determining discounts for the liquidity of target entity in M&A transactions of FSE is formed:

- when estimating the value by market-based method comparing the estimated FSE to the counterpart which differs in the level of liquidity;
- when estimating the value by cost-based method the market value of the assets is determined by an appraiser taking into account their liquidity;
- when estimating the liquidity to determine the feasibility of FSE' restructuring after the M&A transaction is recognized inefficient on the basis of:

$$k_L = \psi(X1, X2, ...X5). \quad (5)$$

The authors' suggestions on expert estimation of the factors' significance are listed in Table 1.

Table 1. Substantiation of discounts for illiquidity of target business, % of the business value (Geus, 1997)

Business characteristics	Expert estimation of the characteristics, 100-point scale	K_L estimation for strategic buyer	K_L estimation for financial buyer
1. Financial stability	♦ high, 0-10 points ♦ normal, 11-50 points ♦ low, 51-100 points	0.0 2.0 6,.0	0.0 2.0 10.,0
2. Liquidity of fixed assets	♦ assets are liquid, 0-10 points ♦ assets are illiquid, over 10 points	0.0 1.0	0.0 5.0
3. Growth prospects	♦ higher than the market ones, 0 points ♦ corresponding to the market ones, 1-30 points ♦ lower than the market, over 30 points	0.0 1.0 5.0	0.0 2.0 10.0
4. Company size (annual revenue)	♦ over $100 mln, 0 points ♦ from $25 to $100 mln, 1-30 points ♦ less than $25 mln, over 30 points	0.0 2.0 3.0	0.0 2.0 3.0
5. Stake of shares acquired	♦ majority, 0-10 points ♦ blocking, 11-30 points ♦ minority, over 30 points	0.0 3.0 10.0	0.0 3.0 7.0
Minimum/Maximum		1.0/25.0	1.0/35.0

The recommended limits of illiquidity expert estimation are based on the fact that, firstly, the influence of illiquidity for the financial buyer is more important than for strategic buyer; secondly, the maximum degree of illiquidity impact corresponds with stable empiric values (35%). For the impact of quantitative estimation of business liquidity on restructuring FSE we used the following assumptions: making decision on the admission of inexpedient businesses merger and its selling takes two years; the assets are sold at a price of purchase (A_0), adjusted to their liquidity (k_L), and are not to bring any profit within two years (Caluwe, 1997).

Losses of the entity-buyer in the purchase and sale of business of non-public FSE under these assumptions can be expressed as:

$$\Delta A = A_0 \cdot (1 + R_{bp}) \cdot k_L . \quad (6)$$

The relative decline in the value of the merged FSE resulting from the acquisition of illiquid business (entity or its assets) is equal to:

$$\Delta PV = \Delta A / (PV_A + PV_B) \quad (7)$$

If the purpose of shares acquisition of public FSE is, as a rule, their inclusion in the balanced portfolio, the purpose of shares acquisition of non-public FSE is getting control over them. Thus, the size of the interest when estimating its value is of particular importance.

In contrast to the widespread approach of estimating the discount of shares price in minority stake, we consider the formation of the majority stake of non-public FSE as a form of takeover. Control cost estimation (bonus for majority stake) is an element of substantiation of transactions feasibility and efficiency.

The practical significance of estimating discounts on its minority is associated with large increase and availability in estimation activities of such a large number of diverse proposals by means of discount determination and its rate. M&A market requires special theoretical justification of the

impact of stake size on its value. It is necessary to take into account the motives of the potential buyer and the rights he receives.

The analysis of publications on the issues of determining the discount for minority stake showed (Barton, 2004, among others) that it is based on the principle of reducing the cost of shares when the size of the stake decreases due to the minor powers of the shareholder. We have classified practical and theoretical proposals for considering the impact of the stake size into three groups.

1. Methods based on statistical data on the actual premiums paid for the same business. The best known among them is the method based on the methodology offered by P. Gaughan (Gaughan, 2006). According to it the premium for controlling stake is 30-40%, or discount for the minority stake is 20-25%. This level of premium was used, as indicated in, in most transactions at the United States market in 1990s.

Currently the ceiling premium for controlling stake, fixed in the works of S. Pratt (40%), remains as the guideline for other methods. This level remains as the guideline at the United States market as well: in 1980-2011 it averaged 41.3%, varying in different years from 35.1% to 49.9%. However, recently the amount of premium to be paid in M&A transactions at United States market is no longer clear differentiated (Table 2). There are almost no differences in premiums.

Table 2. Comparing majority and minority stakes by the rate of premium paid in M&A transactions in 2002-2012 (statistics on M&A deals)

Year	Premium for majority stake, %	Premium for minority stake, %
2002	42.3	39.6
2003	35.4	32.6
2004	41.3	38.3
2005	38.7	38.3
2006	40.7	54.5
2007	44.1	61.7
2008	37.1	29.4
2009	35.9	22.4
2010	40.7	39.5
2011	43.5	33.0
2012	49.1	53.8
Average	40.8	40.3

We believe that the convergence of premiums is firstly due to the fact that the table doesn't show whether transactions were carried out by public or non-public FSE. The empirical data contain mainly the results of transactions with public FSE, where the majority stake has relatively less effect than in case of non-public entities. Secondly, the data integrate the impact of expected synergies and control effect on the premium rate.

2. Control ratios which are determined by the rate of estimated share and go up with it. The control ratio for 75-100% stake is 1.0, for the stake from (50% + 1 share) to (75% − 1 share) is 0.9, etc. According to them, the discount from the standard price reduces from 0% when estimating majority stake (from 75 to 100%) up to 40% when the share of estimated assets is less than 10%, regardless the degree of the share capital concentration (Treacy, 1995, among others). This approach also reduces the possibility of subjectivity (ordered estimation), but at the same time there are substantial errors in estimating differences in the assets value.

3. Recently a principle of control effect depending on the size of stake has become widespread (Sirower, 2008, among others). Based on this principle methods of (share) capital structure analysis (SCSA) have no methodological justification yet due to some unsettled theoretical issues, but there have been developed proposals on its implementation. Among them the most reasonable way is set out in Anslinger (1996) and developed in Bakker (1998), among others). It is based on two components that define the rate of premium for a stake size. The first is premium for quantity of shares giving the right to the additional effect without changing the power of control. This premium in Goold (1998) is calculated by proportional allotment of total effect of control between shareholders.

The second is premium for legal benefits given by majority stake. The authors assume that there are three levels in the stake structure, which change the level of control in spurts (25% + 1 share, 50% + 1 share, 75% + 1 share). In equivalence of the stakes value depending on the interest structure is also taken into account. Thus, the premium for the minority stake can be determined by two groups of factors – external factors (opportunity for shareholder who has the majority stake to take the effect due to the integration of acquired assets with his other business assets) and internal factors (ability to reallocate a part of the FSE market value in favor of shareholders who have majority stake at the expense of those who have minority stake).

Taking into account the above-mentioned, the next view of the business value dynamics depending on the acquired stake size appears to be objective. The rights of separate stakes' shareholders depending on the level of their control determine the highest value of the shares in the majority stake (50% + 1 share). It is higher than the value of share in blocking stake and stake up to 75%. In turn, the share value in the minority stake and the stake of over 75% is lower than the value of the share in blocking stake. But the total stake value is steadily increasing. These regularities are reflected in Figure 2 as polygonal lines and smooth curves.

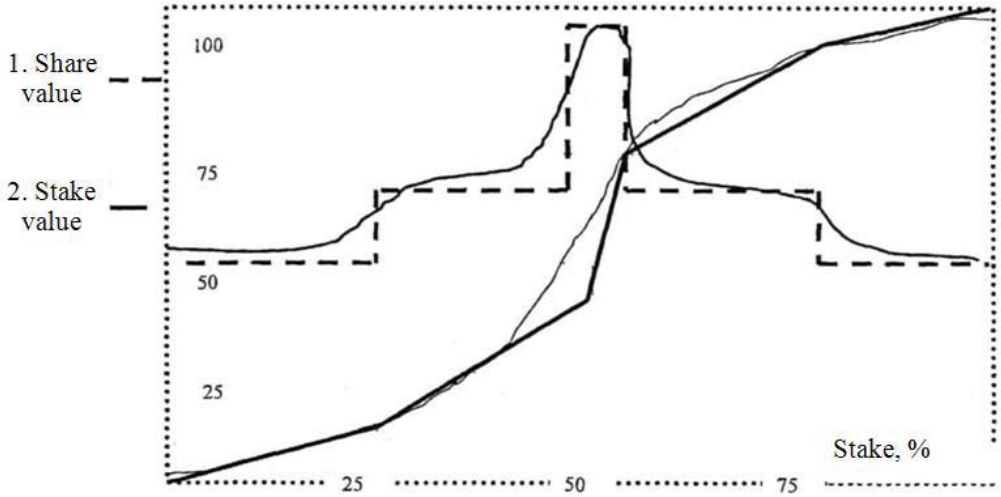

Fig. 2. The dependence of share and stake value on its size

The polygonal lines correspond to the assumption of one-time acquisition of the relevant stake; approximations correspond to the stake acquisition through several transactions.

The specific values of the shares and stakes in the figure are relative. The differences in shares value in minority and majority stakes can be both less and more than 30-40%, depending on the degree of synergy and the impact that a majority stake shareholder could make on the FSE cash flows.

In a number of works (Davenport, 1998; Gaughan, 2006; Hers, 1997) when modeling the value of a stake depending on its size the authors introduce an additional reference that the shares acquisition between points of control growth has only one objective – income. This reduces the total shares value as a source of income and a condition for company control. This reference seems to be false because the strategic goal – acquisition of control over FSE – is more realistic when the stake approaches the majority percentage.

Besides the cost factors, the transaction price also depends on external conditions (information asymmetry, environmental conditions, etc.). Therefore, the use of empirical information on the premiums for the value of majority stake of non-public FSE will always contain a constituent part related not to market value but to characteristics of the transaction as an investment project. The use of empirical data should be preceded by the analysis of transaction conditions and the current situation of powers distribution.

The maximum premium for control at the level of 40% used by many experts creates an illusion of the validity of the method. But in reality its popularity means specialists' renunciation from the analyses of real impact of interest size on the expected effect, an opportunity to get rid of the problem by invoking an authority or traditional character of the approach. According to various sources, discounts for minority stake vary widely. S. Pratt, for example, specifies the limits between 20% and 70% (Aoki, 2010). We agree with the conclusion of Stanley Foster Reed and Alexandria Lajoux (Reed, 2007) that, in many cases, the excess of the majority stake value over its objective cost includes not only the premium for its control, but also part of the synergy effect of merging businesses which is achieved by acquiring a majority stake. When analyzing the algorithm used in (Harari, 1997), we note that the author's estimation of the control level depending on the size of the stake (Table 3) does not take into account the opportunities of minority shareholders and methods of hostile takeover.

Table 3. The level of control depending on the stake size (Thompson, 2010)

Interest size	Level of control
Up to 25%	0
From (25% + 1 share) to 50%	0.12
From (50% + 1 share) to (75% – 1 share)	0.88
75% and above	1.00

Therefore, the recommended algorithm can only be used to obtain approximate values in the stakes estimation in mergers and acquisitions.

Thus, for non-public FSE the analysis of the relationship share value in the stake and its size, the theory and practice do not provide an objective estimation of the impact of the estimated stake size on its reasonable market value. The suggested method of considering the stake size impact on its value for non-public FSE when preparing and implementing mergers and acquisitions, is based on the following principles arising from the above analysis.

1. In M&A transaction it is necessary to distinguish two types of premiums: premium for control in the absence of synergy effect and premium for expected synergy effect.
2. Dependence of the share value on the stake size is determined by the stake holder's opportunity to control the income (profits) of FSE and on this basis to get additional income. The key factors that create value for shareholders are additional profit and/or other income that can be received. Therefore, it is necessary to assess the opportunities and sources of additional profit per share for the majority stake holder.
3. To estimate objectively the premium for control, it is necessary to distinguish effects that a shareholder can get depending on the stake size according to their sources and to determine their maximum values (Marks, 1998, among others).

For the majority stake holder the first way to obtain additional profit per share is the possibility to change the structure of the cash flow without changing the profile and the specific character of FSE, i.e. preserving the conditions on the basis of which the value of financial business is determined by the income-based approach. Extra profit of majority stake holders in addition to the existing stake will determine the maximum value of control.

The second source of premium for entrepreneurs holding controlling and (or) blocking stakes is possibility of radical change in cash flow for the benefit of the majority stake holder. The possibility is real, in case this way of using capacity of the acquired FSE provides its holder with greater effect than the first option.

A third source of premium for the interest size is that almost any acquisition of non-public FSE' shares is to be considered in connection with acquisition process. Firstly, non-public FSE' shares are bought not to form a balanced stake, but to get control over the entity. Only in this case the shareholder can expect an acceptable level of profitability. Secondly, the shares are purchased by individuals (or by legal entities representing individuals) who run their own business which became the source of funds to finance the transaction. In most cases these may be people who have business and experience in running it (Drucker, 1992).

The use of premium for majority or discount for minority nature of the transaction depends on the used evaluation method. It is considered that the income approach allows determining the value of the financial business (or equity of the entity in the financial sector) under complete control. In this case, there are used discounts due to minority nature of the interest. But among the shareholders (owners) of the non-state financial sector entity may already be (usually are) holders of majority stake or (and) some holders of blocking interests of this entity. They have already implemented their premium for the interest size.

These bonuses of majority interest holders have reduced the profits of the financial sector entities and, therefore, cash flow and business value in its evaluation using methods of income approach. In cases of majority interest holders of non-state entities in the financial sector there should be measured not discount in minority interest, but premium in the majority (blocking) interest.

Differences in the value of the majority and minority interests of non-state entities in the financial sector may be objective only in cases where transaction results in forming the first majority interest and the cost is determined on the basis of income approach. This leads to the change in proportions of distributing cash flows: a majority interest means the ability to get an additional effect by its holder, which should be reflected in the interest value (Katzenbach, 1997).

4. Premium for expected synergy effect implies the possibility of its realization and depends on the value ratio of the acquired business and the size of the effect. In organized and highly competitive financial market, synergy (net of premium for owners of business-goal) will be distributed among the holders in proportion to their share in authorized capital.
5. Change in structure of (property) owners as a result of the sale and purchase transaction, the new holder of the controlling interest can lead to higher requirements to premiums for controlling on the current level. This makes urgent the assessment of the maximum additional effect of the majority interest holders provided that the business development strategy of financial sector entities is preserved.

Calculation of the maximum control value is conducted on profit before taxation, excluding investment provided by the financial plan, where cash flows for forecast period were formed when estimating the cost by method of income approach. An additional effect the holder of majority interest can obtain through the transferring a part (or bulk) of the net profit (including synergy) after investing in the costs.

Additional interest cost (premium) will be determined by the capitalization under tax economies on profit derived by this or that holder. Let us assume that planned by merged company dividends are equal to *Div*. It is expected that holders of majority interests have already got certain premiums.

They can get corresponding share dividends. Profit paid by installments for paying dividends, taxes ($Div \cdot \tau / (1 - \tau)$) will correspond to the maximum (including synergy) additional premium, which the holders of majority interest can get, provided that the strategy for the development of the financial sector is preserved. Problem of valuating the premium for the size of interest in this approach is in distributing the total effect between principal shareholders. If 1 = 1, L = the number of principal shareholders (Q_l – size of l-interest) who can take the effect of lower taxes, the pocketed profit by l-shareholder is:

$$Pr_1 = \{Div \cdot \tau / -(1-\tau)\} \cdot (Q_1 / \Sigma Q_1). \quad (8)$$

Increasing the costs on the value $Npr / (1 - \tau)$ reduces the value of the business by Npr / r. If we assume that the majority shareholder (share in authorized capital is equal to d) of sold company can get as personal income the full amount of costs increase, then it will bring him the effect equal to:

$$Э = Npr / (1-\tau) - d \cdot Npr / r. \quad (9)$$

The sum of these interests' capitalizations at the rate of return on equity will determine the size of the maximum additional premium for control.

$$(\sum \Delta PV_1 = \sum Pr_1 / ROE).$$

The effect is positive if $1 / (1 - \tau) > d/r$.

The suggested method of distribution means proportional division of the additional effect of majority interest between their holders. It can be assumed that it is possible that all the additional profit will assign the principal shareholder, or, on the contrary, the principal shareholders will not qualify for this part of profit of non-state financial sector entity. But to allot these situations and take them into account at the stage of preparing transaction on the sale of interests is impossible. Thus, to determine the value of the acquisition of non-public entities in the financial sector when forming major minority interest, we suggest the following algorithm to assess premiums for control (Scott-Morgan, 1994):

- analyzing the structure of evaluating non-state financial sector entity and assessing premiums of principal shareholders. In case there are no premiums before transaction, opportunities of their formation are observed;
- determining the value of the business on the basis of income approach, provided that the premiums are preserved, that will determine the value of the shares in minority interest.
- determining the value of shares in proportion to its size. The given value will reflect the cost of interest without additional premiums, but in view of already existing;
- determining the value of extra premiums that may be obtained by the principal shareholders. The total amount of premiums is determined by profit before taxation, which remains after investment;
- determining the principal shareholders, who share the savings on taxation profit after the investment. Its capitalization specifies extra premium for principal shareholders.

The effectiveness of radical change in financial business (restructuring up to the sale of assets) excluding synergies is beneficial for majority shareholder, if assumed profit after sale of assets and the value of his restructured business shares (taking into account the above-mentioned premiums) is more than the value of his shares before restructuring (including premiums).

In transactions of friendly takeover, premium size is of the essence for holders of controlling and blocking interests of business-goal (Hammond, (1998, among others). The size of the premiums for these interests is determined by the total size of the premium (P), which is a part of synergy, and the proportions of its distribution between holders. The cost of the merged entity in the financial sector (BPV_{AB}) is determined by preserving the existing premiums entity-buyer and part of synergies (S-P-E). Therefore, the maximum allowance to the investment value of entity-goal, which includes premium (P) and expenses (E), in this case have a single purpose (takeover expenses) and may not exceed the synergy of merging financial businesses.

Let us take two parts of the total premium (P_1 and P_2). The first is a premium, distributed among all the shareholders of taken over entity in the financial sector in proportion to their share in the authorized capital. The second is the additional premium for principal holders, paid in the form of special bonuses. Economic incentives for the holders of the taken up entity in the financial sector in merge are premium to the cost of majority interest, and equal to ($k \cdot P_1 + P_2$).

Therefore, the total premium for control of entity-goal in a friendly takeover is equal to the sum of bonuses and premiums paid for acquisition.

For the entity-buyer, synergy of merger is expressed by the condition:

$$BPV_{AB} - (BPV_A + BPV_B). \quad (10)$$

In equation (10) the value of taken up business (BPV_B) is a market value, including previously marked additional effects that can be used by the new holder, i.e. it corresponds to the cash flow, initiated by this entity in financial sector without taking into account bonuses of principal shareholders.

Thus, the effect of merger for the buyer is equal to:

$$E_{AB} = S - (P + E). \quad (11)$$

Its distribution between the shareholders (stakeholder) of non-state entities in the financial sector is determined by the level of their control. The effect can be distributed among holders of controlling and blocking interests.

Possibility to assign a significant part of the value of the entity-goal and synergy of merging entities in the financial sector by managers-holders of controlling and blocking interests gives reason for the background principle difference of *CAPM* model (Capital Asset Pricing Model) of state and non-state entities in the financial sector. We believe that the CAPM model of non-state entities in the financial sector must take into account the differences in the profitability of shareholders' majority and minority interests. If the return on equity of non-state financial sector entity is defined for the absence of bonuses for principal shareholders, then the return on equity in majority interest will include Premium ($+\Delta R$), while in the minority – a discount ($-\Delta R$). The method of calculating the premium has been listed above. In *CAPM* model the return on shares of financially dependent entity in the financial sector (R_{fn}) is equal to:

$$R_{fn} = R_{bp} + ERP \cdot \beta \left[1 + (1 - \tau) \cdot \mathrm{D/E}\right] + SCP + \\ + SCRP + \Delta R. \quad (12)$$

Graphically, it is a function representation $r_f = \psi(\rho)$ with lines for different stakes (Figure 3).

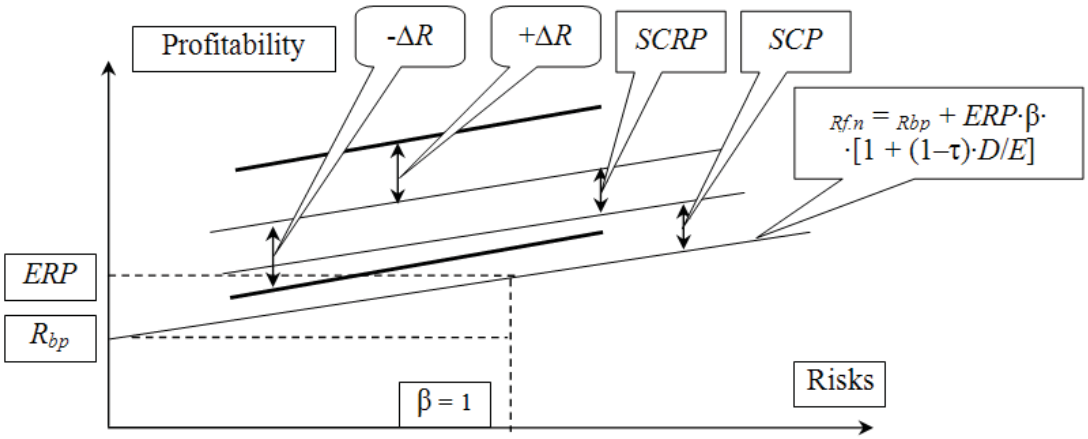

Fig. 3. Return on equity of non-state entities in the financial sector

We would like to note some feature of the impact assessment of acquired shares size on its cost in case of hostile takeover. Hostile takeovers may occur through the initial acquisition of shares, and the subsequent control and assigning a synergy effect through pressure on the shareholders. The shares value in minority interest in this case may exceed the value of the shares in majority interest. We do not analyze the different techniques of raiders by hostile takeovers (Nevis, 1996, among others), but we note the need for a special approach to valuation of minority interest cost as a stage of hostile takeover in the financial sector.

As methodological basis of the generally accepted tools for valuating business is expert estimate of cash flows, risk, impact of interest size and other indicators and the possibility of subjective results. The ambiguity and risks of the predicted values of these indicators can be significantly reduced when using stochastic models of business evaluation. Stochastic models are also based on certain assumptions of experts, but their quantity and subjectivity can be significantly reduced.

Let us suppose a financial business is considered, the cost of which (BPV), related to a specific primary date, is described by the expression:

$$BPV = \sum_{t=1}^{T} CF_t \frac{1}{(1+r_t)^t} + \frac{CF_T}{r_T (1+r_T)}. \quad (13)$$

In equation (13) the CF_t value represents the cash flow at time t, r_t is the discount ratio, T-fixed time ($T = 5$). The first element is the value of the business, initiated by cash flow in forecast period, the second − by cash flow in residual period. The cost of the financial business *BPV* is treated as a random variable, stochastic nature of which is determined by the discount rate. Ratio structure (bid) of discount as stochastic variable is set by the expression $r_t = r_{0t} + \Delta r_t + \varepsilon_t$.

The first summand is an a priori known given component (risk-free rate), the second is a function of risk, and the third reflects the process uncertainty (random variable), since the first summands are determined by the expert. Next, let us take:

$$r_t = r_{Эt} + \varepsilon_t. \tag{14}$$

Basing on the analysis of the business valuation results, combination of domestic financial sector entities, and scope of defining this random element we determine in the range:

$$0 \le \varepsilon_t \le 3r_{0t}. \tag{15}$$

In this range it is set the probability density $f(\varepsilon_t)$ of the random variable ε_t. This allows finding basic probabilistic characteristics of the financial business.

Cash flow values are assumed as deterministic, calculated on the basis of the perspective development of the financial sector entities. The cash flow in the residual period is assumed to be equal to the cash flow of the last year forecast period ($CF_T = CF_5$).

Mathematical expectation of business value $m_{BPV} = M(BPV)$:

$$m_{BPV} = \sum_{t=1}^{T} CF_t \cdot M\left[\frac{1}{(q_t + \varepsilon_t)^t}\right] + \\ + CF_T \cdot M\left[\frac{1}{(r_{0T} + \varepsilon_T)(q_T + \varepsilon_T)^T}\right], \tag{16}$$

where $q_t = 1 + r_{0t}$, and hence, the computational problem is in average values centered under the sign of the operator M.

Let us designate $m_t = M\left[\frac{1}{(q_t + \varepsilon_t)^t}\right]$,

$$m_T = M\left[\frac{1}{(r_{0T} + \varepsilon_T)(q_T + \varepsilon_T)^T}\right].$$

Then, $$m_t = \int_{-\infty}^{\infty} \frac{1}{(q_t + \varepsilon_t)^t} \cdot f(\varepsilon_t)\, d\,\varepsilon_t, \tag{17}$$

$$m_T = \int_{-\infty}^{\infty} \frac{1}{(r_{0T} + \varepsilon_T) \cdot (q_T + \varepsilon_T)} \cdot f(\varepsilon_T)\, d\,\varepsilon_T, \tag{18}$$

To perform these operations, we must define the density of probabilities $f(\xi)$. Backgrounds on the law of distribution $f(\xi)$ do not allow us to postulate it with confidence. We have considered the option of a triangular distribution of discounting ratios on Simpson law on the ranges (r_{0t}; $4r_{0t}$). This law of distribution roughly corresponds with the normal law, but it is easier in its conversion. Let us set the probability density ratios

$$k(a,b) := \frac{4}{b^2 - a^2} \tag{19}$$

$$f(a,b,x) := \begin{cases} f \leftarrow k(a,b)\cdot(x-a) \text{ if } a \le x \le \frac{b-a}{2} \\ f \leftarrow -k(a,b)\cdot(x-b) \text{ if } \frac{b-a}{2} \le x \le b \\ f \leftarrow 0 \text{ otherwise} \\ f \end{cases} \tag{20}$$

To calculate the first summand of business value in the basic model (19), we find:

$$m(a,b,q,t) = \int_a^b \frac{1}{(q + x)^t} \cdot f(a,b,x) \cdot dx. \tag{21}$$

The second:

$$m_T(a,b,q,c) = \left[\int_a^b \frac{1}{(c + x)(q + x)^T} \cdot f(a,b,x) \cdot dx\right]. \tag{22}$$

The quantitative assessment of business, obtained by calculating integrals for given conditions, is a confidence interval.

Let us consider the valuation of financial business in stochastic discount rates and cash flows. The method of a financial business value is used as stated in Mayer (2001). Sequence of CF_1, CF_2, ..., CF_T cash flows is interpreted as a sequence of correlated random sequence, limited by specified circumstances in sections. The ranges of cash flows changes are determined by the expert. They reflect the condition of forecast uncertainty growth with increasing the forecast depth. Values CF_t within the specified ranges are distributed under the Simpson's law.

Similarly, the sequence of discount rate values is recorded, but the ranges of its change are taken as common for all periods. Correlation of the values CF_t and CF_τ, $t \ne \tau$, is determined by the function:

$$r(t,\tau) = \exp\left\{-\alpha\left|t - \tau\right|\right\}, \tag{23}$$

where α characterizing the "correlation time". Values q_t and CF_t are taken as mutually independent. Then:

$$M_{BPV} = \sum_{t=1}^{T} \overline{q_t} \cdot \overline{CF_t} + \overline{Q_t} \cdot \overline{CF_T}, \tag{24}$$

where

$$\overline{q_t} = M\left\{\frac{1}{(1 + r_t)^t}\right\},\ \overline{Q_T} = M\left\{\frac{1}{r_t\,(1 + r_T)^T}\right\}, \\ \overline{CF_t} = M\left\{CF_t\right\}. \tag{25}$$

The dispersion of a financial business value is defined as:

$$D_{BPV} = M\left\{\left(\sum_{t=1}^{T}(q_t CF_t - \overline{q_t CF_t}) + (Q_T\, CF_T - \overline{Q_T CF_T})\right)^2\right\}. \quad (26)$$

A significant increase of the dispersion can be explained by variability in two variables (cash flow and discount rate) compared to the previous one variable to be considered.

Here are the quantitative results of probability characteristics analysis of a financial business value and their application in assessing the business value of the financial sector entity.

Often the cost estimates of the financial business are preceded from the symmetry of expectations about cash flows and discount rates. However, the experience of the medium-term plan of such a business shows that by the stagnation of the world economy this premise is overly optimistic, and by trends of economic stabilization, in contrary, is pessimistic.

To take into account the asymmetries of information, the following comment conserved to be important: the law of distribution of financial business cost functions in asymmetric proxy variables theoretically is unknown, there are no general premises. This fully applies to changes in the cost of the merged entity in the financial sector. For partial cost, initiated by the cash flows in the residual period due to large quantity of cash flow elements, theoretically as the distribution law we can consider the Gauss law (Doz, 1998, among others).

Basing on the probability density and general properties of the traditional triangular distribution patterns of Simpson, we may introduce for consideration the asymmetry distribution of Simpson (depending on the parameters ration a, b, c with getting the probability density having various nature of asymmetry):

$$f(a,b,c,x) := \begin{vmatrix} f \leftarrow \dfrac{2}{(b-a)(c-a)}(x-a) & \text{if } a \le x \le b \\ f \leftarrow \dfrac{-2}{(c-b)(c-a)}(x-c) & \text{if } b \le x \le c \\ f \leftarrow otherwise & \\ f & \end{vmatrix} \quad (27)$$

The further solving of evaluating a financial business task is done with the modified probability densities of discount rates and cash flow. The shift towards lower values of financial business is the result of asymmetric distributions background.

Conclusions

The developed technique has two important properties, missed in the previously existing theoretical and practical techniques. Firstly, it allows defining the law and confidence intervals of changes in value. This characteristic increases the validity of the evaluations as a tool for transactions with financial business. At the same time, the validity of strategic plans for the financial sector growth increases. Secondly, it forms the theoretical basis of the justification of strategy options based on probabilistic approach to their implementation and effectiveness. Further development of this approach may lead to the development of tools for the definition of threshold limit values of the probabilities, accepting a certain level of strategy efficiency.

We consider that the problem of the reliability of stochastic models for valuation of financial business nowadays is in undeveloped ways of assessing the variability of cash flows and discount rates. We have proposed the method where stochastic cash flow characteristics are based on qualitative analysis of cash flows of a number of financial sector entities, on which they assessed business. You can use this approach as the most data secured option, although it requires a significant amount of information.

Variability of discount rates cannot be determined by empirical data. The only currently available option is expert evaluation, based on the assessment of the competitive advantages dynamics of financial sector entity. The stability of the financial sector and the high score of growth prospects of its competitive advantages should reduce the level and variability of discount rates. Lack of growth strategy − on the contrary, increases it. At the same time, it is desirable to provide logically normal distribution law on cash flow, shifted in the direction of greater decline, and the law of discount rates change, shifted in the direction of their growth.

The proposed technique is of particular interest to ground decisions on the merger (takeover) of the financial sector entities. Approaches within such a technique provide the opportunity to significant improving the reliability of valuation of the financial business, both parties of transaction and the merged entity in the financial sector. As a result the objectivity and validity of choosing the entity-goal and the conditions of merger efficiency with private entities in the financial sector improve. It is achieved by justifying the assessment method, the maximum level of premiums of financial sector entity (that is taken over), assessing the transactions effectiveness for principal shareholders, business assessment in the form of the range of value for a given probability.

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