

Statistical modeling of factors determining of the value of international companies' internally generated goodwill

Natalya V. Kovtun¹, Mykhailo V. Zborovskiy²

Abstract

The internally generated goodwill how key indicator of business reputation of the companies was observed in this article. Regularities of the formation of internally generated goodwill of 26 international companies are explored. The analyzed companies were clustered by two parameters: Tobin's Q of every companies and the index of return of average capital employed. Authors have searched the reasons of increasing of internally generated goodwill in every cluster of companies in this article. The influence of the factors that determine value of internally generated goodwill is evaluated and the reasons that affect its recent rapid growth is studied.

Thus, determining factors in cluster A (cluster of companies with relatively less internally generated goodwill) are: potential and scope of activity, the value of previous period internally generated goodwill. Dependence is more complicated in cluster B (companies with relatively high level of internally generated goodwill). The value of index is determined by: potential and operating results, accumulated goodwill of four previous periods as well as economic disturbances (shocks) of three previous periods. Thus, goodwill accumulated in previous periods is more important factor for companies with relatively high value of internally generated goodwill than for companies with relatively less value of it.

Keywords: *business reputation of company, internally generated goodwill, cluster analysis, ARIMA*

JEL Classification: *G320, C320*

1. Introduction

The processes of globalization in modern economy lead to the formation of highly efficient companies that become leaders in their industries. This leadership encompasses not only economic and financial activities. First of all, these companies are notable for high-tech features and can be called flagships of technological and scientific progress, since the results of their operation go far beyond local achievements and can be applied to various types of activities. The economic nature of the competitive advantages of modern companies that are world leaders is currently actively explored by the world's leading scientists (Copeland et al., 2000). Thus, there are different methodological approaches, different techniques, and, accordingly, different outcomes (Damodaran, 2012).

¹ Natalya V. Kovtun: Taras Shevchenko National University of Kyiv, Faculty of Economics, Vasylkivska Street, #90, Kyiv, Ukraine, kovtun_natali@ukr.net

² Taras Shevchenko National University of Kyiv, Faculty of Economics, Vasylkivska Street, #90, Kyiv, Ukraine, mykhailozborovskiy@gmail.com

As of now there have already been developed quite a lot of concepts and theories to explain leadership positions of leading companies. Unfortunately, however, the variety of methodological principles and methods of evaluation of competitive advantages lead to different conclusions. Still, a thorough statistical analysis based on an integrated approach to the analysis of various aspects of companies' competitive advantages that, in our opinion, are at best accumulated in the internally generated goodwill of a company was not performed so far.

The article aims to explore the formation patterns of the internally generated goodwill of international companies, as well as evaluate the impact of factors determining its volume and influencing its dynamics.

The internally generated goodwill is a valuation of intangible resources that belong to a company and make it possible to obtain high profit, yet, are not included into the assets of the company (Umanciv, 2006, p. 24). According to IAS 38 "Intangible Assets", the internally generated goodwill is not recognized as an intangible asset, since it is not an identifiable resource (i.e. it is not separable and does not originate from contractual or other legal rights) controlled by a market participant and cost of which can be reliably estimated (IAS 38, p. 48). In the academic world the internally generated goodwill is explained as a company's reputation accumulated over many years. However, the processes of globalization in the modern world prompt certain adjustments to the content of this concept. Based on the economic nature of emergence of the internally generated goodwill, the following main hypotheses that will lay the foundation of this study are put forward:

First, the combination of the main factors determining the value of the internally generated goodwill depends on the scale of company's activities, the level of implementation of high technologies and the degree of social responsibility of a company.

Second, the volume of the internally generated goodwill in the current period will largely depend on its value in the previous periods. This is completely logical, given that the internally generated goodwill is a cost reflection of a company's reputation.

Third, the volume of the internally generated goodwill will be greatly affected by the financial results characterizing the performance of a company.

2. Clustering of international companies according to identified features

We will begin with testing the first hypothesis suggesting that the different size of companies leads to a different nature of influence of factors on the value of the internally generated goodwill. Statistically, it is reflected in multi-vertex distributions by defining characteristics. This distribution will be indicative of the presence of several homogeneous sets in the

sampling body for identification of which it is expedient to carry out clustering that we have implemented by the following parameters:

- Tobin's Q – an indicator that shows the relationship between the market and book value of a company's assets (X_1);
- ROACE (return of average capital employed) – the average return on working capital (X_2).

The clustering procedure was carried out by using the logistic regression method (IAS 38). The method of logistic regression lies in dividing the sampling body into two clusters by the two selected properties of X_1 and X_2 . To achieve this goal the division line is determined. The division line is a theoretical straight line that divides the set of companies into two clusters. The implementation of this procedure allowed us to produce an equation of the division line that is clearly shown in Fig. 1. Thus, all points to the left of the division line belong to cluster A, while those to the right of the line – to Cluster B. The identification of clusters is provided in Table 1.

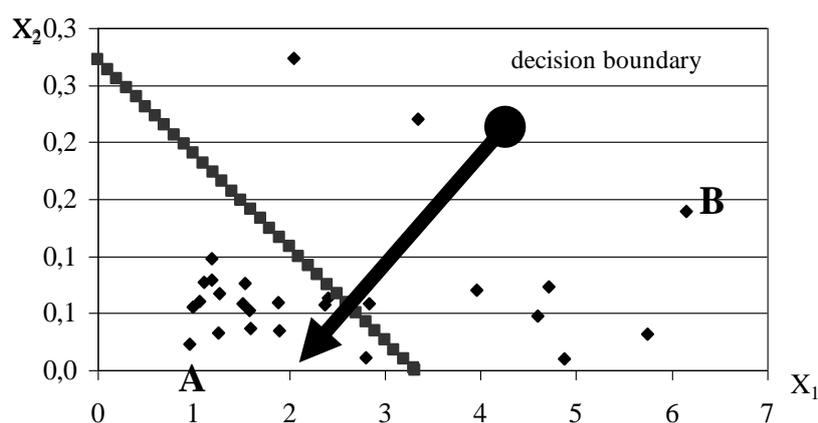


Fig. 1. Results of companies clustering according to analyzed features.

Source: own calculations based on (Securities and Exchange Commission).

As you can see from the table, 17 companies have got into cluster A. The Tobin's Q and ROACE parameters during the period under study (from the fourth quarter of 2007 to the third quarter of 2011) were characterized by lower values than similar indices of companies in cluster B. Thus, we can argue that cluster B has embraced companies having a higher level of market capitalization to book value, or (and) those with the best financial performance.

Cluster	Amount of companies	Names of companies
A	17	AG, Ambev, Cisco, Cocacola, HD, Canon, AL, Intel, Oracle, P&G, PhM, Samsung, SAP, TSM, UT, Visa, Wd
B	9	Amazon, Apple, Google, Micro, IBM, J&J, Pepsico, Qual, Schlum

Table 1 Structure of clusters by companies according to the conducted clustering.

3. Identification of major financial components by clusters

After the clusters were identified the assessment of the impact of factors and the analysis of reasons were carried out separately for cluster A and cluster B. To select the optimum factors characterizing the financial position of a company, the following eight financial parameters were identified in an expert way for each of the generated clusters:

Net assets.

- Assets.

- Net sales.

- Earnings before interest and taxes (EBIT).

- Earnings before interest, taxes, depreciation and amortization (EBITDA).

- Average profit per share.

- Average return on working capital (average ROACE).

- Average return activities (EBITDA margin rate).

Note that the averages were calculated as an average mean by the size of the book value of assets of each company.

To determine the optimal set of factors for each of the clusters, the algorithm of the pattern of principal components was applied (Erina, 2001). As a result of realization of the algorithm, estimations for each cluster were obtained (Table 2).

As seen from the data in Table 2, according to the Kaiser criterion (Erina, 2001, p. 152), the components 1 and 2 are recognized as the principal ones. These are the components, taken together, explain 83.2% of variation in the characteristics set of cluster A and 91.1% of variation of cluster B, which proves the high degree of factorization.

In the next step, after application of the rotation procedure (Varimax normalized) a table of values of factor loadings was obtained (Table 3).

Number of component	Cluster A		Cluster B	
	Variation of component	Explained variation, %	Variation of component	Explained variation, %
1	4.994	62.419	6.258	78.219
2	1.660	20.752	1.110	13.881
3	0.642	8.023	0.395	4.940
4	0.450	5.624	0.147	1.836
5	0.197	2.458	0.060	0.754
6	0.051	0.635	0.025	0.317
7	0.006	0.072	0.004	0.046
8	0.001	0.017	0.000	0.006

Table 2 Results of factor analysis for cluster A and B.

№	Financial parameters	Cluster A		Cluster B	
		Factor 1	Factor 2	Factor 1	Factor 2
1.	Net assets	0.97*	-0.15	0.98*	0.01
2.	Assets	0.98*	-0.14	0.98*	-0.01
3.	Net sales	0.85*	0.21	0.90*	0.36
4.	Earnings before interest and taxes (EBIT)	0.93*	0.30	0.90*	0.39
5.	Earnings before interest, taxes, depreciation and amortization (EBITDA)	0.94*	0.25	0.94*	0.28
6.	Average profit per share	-0.75*	0.30	0.96*	-0.02
7.	Average return on working capital (average ROACE)	-0.16	0.89*	0.07	0.99*
8.	Average return activities (EBITDA margin rate)	0.19	0.74*	0.82*	0.11
	Expl. Var	4.98	1.67	6.02	1.35
	Prp. Totl	62.30	20.87	0.75	0.17

*) reliable estimations

Table 3 Factor loading of features by essential components for clusters.

The first component of cluster A connected to indices 1-6 can be identified as a factor that describes the potential and scope of activities; the second component loads parameters 7 and 8 determining the efficiency of capital and operations, which means it is a factor of quality performance.

The first component of Cluster B is related to parameters 1-6 and 8. This component can be identified as a factor characterizing the potential and performance results; the second component loads the 7th change representing the efficiency of capital application.

4. Modeling of international companies' internally generated goodwill

At the final stage of the study we will evaluate the impact of factors on the size of the internally generated goodwill. As mentioned above, one of the assumptions that we put forward at an early stage of the research was the assertion that the volume of the internally generated goodwill affects both its previous values and the financial performance of companies. The following regression equation was taken as a basis for the model of the internally generated goodwill for companies in each cluster:

$$IGG_t^k = F_{1t}^k + F_{2t}^k + AR^k(p) + \varepsilon_t^k, \quad (1)$$

where IGG_t^k is the value of the internally generated goodwill of cluster k ; F_{1t}^k, F_{2t}^k are values of factors 1 or 2 for the k cluster; $AR^k(p)$ is an AR-process of p order of k cluster; ε_t^k is a vector of the remainder of the k cluster. Results of constructing a regression model for each of the clusters are shown in Tables 4 and 5.

Variable	Coefficient	Prob.	Model statistics	Model estimations	Prob.
F1	81476	0.0004	R-squared	0.77	X
C	424502	0.0000	F-statistic	26.74	0.000008
AR(1)	0.479	0.0079	Durbin-Watson statistic	1.65	X

Table 4 Results of the regression analysis for cluster A.

As you can see, the level of adequacy of the constructed model for cluster A constitutes 0.77 indicating that the model explains 77% of variation in the volume of the internally generated goodwill of companies in cluster A. The factor characterizing the potential and

scope of companies' activities and the value of the internally generated goodwill in the previous period turned out to be most significant. We will also mention that the second factor (F_2) was eliminated in the two clusters due to its insignificance.

Variable	Coefficient	Prob.	Model statistics	Model estimations	Prob.
F1	167612	0.0000	R-squared	0.90	x
C	920794	0.0000	F-statistic	36.75	0.000003
AR(4)	-0.67	0.0098	Durbin-Watson statistic	2.83	x
MA(3)	-0.699	0.0045			

Table 5 Results of regression analysis for cluster B.

For cluster B the level of adequacy turned out to be even higher: more than 90% of the explained variation in size of the internally generated goodwill of companies in cluster B. The factor characterizing the potential and performance results, the value of the internally generated goodwill in the previous 4 periods and random disturbances (shocks) of the 3 previous periods.

According to the results of verification for heteroscedasticity (using the White's criterion) and residual autocorrelation (based on the construction of a correlogram of remainders), the validity of conclusions about the interrelation between the formation of the internally generated goodwill and certain identified factors for each cluster was confirmed in the two models.

Conclusions

Thus, the internally generated goodwill is a cost estimation of resources of an enterprise not identified in its assets that are able to bring profit in future. The economic nature of the internally generated goodwill is reflected not only in the accumulated business reputation, but also in the intensity of social responsibility and innovation. Therefore, it was proved that there is a different factor performance depending on the scale of company's activities, as well as the fact that the size of the internally generated goodwill is significantly affected by its previous value and the financial performance of the company.

According to the results of the study, these processes in different clusters indeed took place in a different way. Thus, in cluster A (a cluster of companies with a relatively smaller internally generated goodwill) the determining factors turned out to be: the potential and scale of

activities, as well as the volume of the internally generated goodwill in the prior periods. Meanwhile, in cluster B (representing companies with a relatively high level of the internally generated goodwill) the dependence is much more complicated. The value of a parameter is determined by: the potential and performance results, the accumulated goodwill of the previous four periods, as well as economic disturbances (shocks) of the previous three periods. Thus, for companies with a relatively bigger volume of the internally generated goodwill accumulated in the prior periods, goodwill is a much more significant factor than for companies with its relatively smaller size.

In our further studies, based on these findings we will attempt to develop simulation models for individual companies and groups of companies to ensure the effective management of competitive advantages in the market.

References

- Copeland, T., Koller, T., Murrin, J. (2000). *Valuation: Measuring and managing the value of companies*. (3rd ed., Vol. 492). New York: John Wiley & Sons.
- Damodaran, A. (2012). *Investment valuation: Tools and techniques for determining the value of any asset*. (Vol. 992). New York: Wiley.
- Erina, A. (2001). *Statistichne modeljuvannja ta prognozuvannja: navch. posibnik*. Kyiv: KNEU.
- IAS 38. (n.d.). Retrieved from "International accounting standard 38 "Intangible assets": <http://www.minfin.gov.ua>
- Project "Coursera" of Stanford University. (n.d.). Retrieved from Course of webinars "Machine learning": <https://class.coursera.org/ml-2012-002/lecture/index>
- Securities and Exchange Commission. (n.d.). Retrieved from <http://www.sec.gov/>
- Umanciv, G. (2006). Vnutrishnij gudvil pidriemstva: ekonomichna priroda, problemi ocinki ta obliku. *Buhgalters'kij oblik i audit*, 20-24.