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3-D CLASSIFICATION OF STOCK MARKETS AND ITS USING FOR EVALUATION OF THE FINANCIAL ANALYSIS METHODS APPLICABILITY

Abstract: In the article stock markets peculiarities are investigated, which define acceptability of different decision support methods in stock trading (technical analysis, fundamental analysis, indicators). Existing approaches to stock market classification and clusterization are considered, their shortcomings are shown. Authors' 3-D classification of stock markets is offered, on the base of the following criteria: stock market activity, stock market age, economy development level, information transparency. Conditions of the applicability of technical analysis, indicators and fundamental analysis were evaluated by means of the suggested classification.

1. Introduction

There are many scientific investigations devoted to the decision-making methods in the sphere of stock trading. Sum of them were noted with Nobel Prize [Chernysh 2005]. But these methodologies successfully applied on certain stages of the economy development eventually begin giving unauthentic results. This is bound not only with economic conditions changes in some countries, but with development of the science, society and information technologies, with new stocks appearance, with information volume increasing and simultaneous information validity decreasing.

Application of the traditional financial analysis methods for trading decisions support in new conditions or on the new stock markets, extrapolation of the past tendencies for the future often give incorrect results and lead to negative consequences for the economy and economy subjects, may generate different-scale crises. Application of the same analytical methodologies on the different stages of market development is incorrect also.

Due to the aforesaid, stock market classification is urgent which will allow assessing of the acceptability of financial analysis methods under the certain combination of the market conditions.

2. Analysis of existing approaches to stock market classification and clusterization

In the majority of scientific issues devoted to stock market investigation and financial analysis two classes of stock markets are marked out: developed stock markets and emerging stock markets. Such classification is also used by the international financial organizations.

In Table 1 two stock markets classifications carried out by International Financial Corporation and International Monetary Fund are compared [Siniavskaya 2006, pp. 24-27].

Table 1. Comparative characteristic of the stock market classifications which are used by the international financial organizations

International financial organizations	International Financial Corporation (member of the World Bank group)	International Monetary Fund
Classification criteria	1. The level of shares market development 2. GDP/GNP value per capita	General economic criteria
Number of countries with developed stock markets	23	23
Examples of the countries whose stock markets are related to emerging markets	Greece, Portugal and Israel, related by this organization to countries with the developed economy. Countries with transitional economy and developing countries (post-socialist countries, majority of Asian countries and countries of Latin America; Bulgaria, Hungary, Poland, Pakistan, etc.).	All the countries related by this organization to developing countries, countries with transitional economy and 5 countries with market economy (among them Israel; Greece and Portugal stock markets are related to developed stock markets).

Source: [Siniavskaya 2006].

Another stock market classification presupposes marking out Anglo-American and German stock market models, although at present some researchers note a tendency to gradual smoothing of the differences between these models [Losev 2001]. Characteristics of the given models are described in Table 2.

This classification has some significance for economic analysis, but it is not suitable for decision making methods applicability assessment and choice.

Both above described classifications are too enlarged and simplified. They not allow defining the efficiency and suitability (or inefficiency and inapplicability) degree for different decision-making methods on the different stock market types.

Russian scientists [Batyrshin et al. 2004; Klimova 2004] made an attempt of stock market clusterization on the base of a number of their activity indices. Stock markets were united into the clusters if there was resemblance between the indices values defined by a fuzzy relation. Results of this research are shown in Table 3.

Table 2. Comparative characteristic of Anglo-American and German stock market models

Stock market characteristics	Anglo-American model	German model
A number of circulating on the market shares' tickers	Large	Not large
Liquidity	High	Not high
Volume of trading operations (for the comparable periods)	Large	Not large
Concentration of the share owners rights	Low (the ownership is dispersed between share-holders majority)	High (the ownership is concentrated between several big share-holders)
Stock market role in the investment attraction to the enterprises	High	Not high (bank credits are preferable)
Banks role on the stock market	Banks are restricted in the activity on the stock market	Banks are the main professional members of the stock market
State role on the stock market	State intervention in stock market activity is minimal	State intervention in stock market activity is essential

Source: [Siniavskaya 2006].

Table 3. Results of stock markets clusterization

Cluster	Number of objects (stock markets)	Cluster consistence
A	6	Asia and Europe
B	9	European stock markets
C	7	only Asian stock markets
D	2	Poland and Israel
X	11	there are no common characteristics between stock markets in this cluster and with all other clusters; different countries

Source: [Batyrshin et al. 2004; Klimova 2004].

There were revealed 4 clusters (A, B, C, D). From 35 investigated stock markets 24 were related to these clusters and 11 stock markets have not any similar characteristics and that is why they were united to the X group [Batyrshin et al. 2004].

Besides stock market condition was interpreted as a point in 2-D and 3-D space [Klimova 2004]. Herewith 15 key indices were analyzed which characterized an activity of 15 stock markets of different countries from the 1996-2003 years. For the data processing a genetic algorithm was applied. In that article [Klimova 2004] the main emphasis was laid on the similarity of quantitative indices values characterizing stock markets activity, but qualitative dependences and qualitative cluster particularities were not revealed.

3. Financial analysis and its types as decision-making tools on the stock markets

To reveal stock markets particularities which have influence on the decision-making methods choice it is necessary in the first instance to define what conditions can lead to the existing methods inapplicability. Decision substantiation always supposes information analysis. If the information is unavailable, partially available or has volatile structure or bad comparability then methods in which such information is necessary will inapplicable (in the first case) or will give incorrect results (in other cases).

For decision making on the stock markets traders and financial analysts use 3 main financial analysis types:
– fundamental analysis;
– technical analysis;
– indicator analysis.

Let us consider what information is used in each case. Fundamental analysis is related with emitters' financial condition investigation and evaluation, with revealing of the changes trends of macroeconomic indices, and with the assessment of the influence of political and other news and rumours on the security prices. Technical analysis presupposes price trends investigations at the admission that fundamental factors are constant. Indicator analysis is based on the different graphs which describe changes of the indicators (i.e. indices derivative from the security price value or in some cases from the volume of trading). Indicators' values are correlated with the price trends and as a result trading recommendations are formed such as "to buy", "to sell" or "to hold the securities". Sometimes in scientific literature indicator analysis is considered as a part of the technical analysis [Dourra, Siy 2002], because in both cases a price trend is the investigation base.

Thereby, fundamental analysis requires the availability of current statistics about emitter's financial condition at least for one (last) period, of information about the most important events in the economy and emitter's activity ("life"). Technical analysis and indicator analysis require the presence of historical data about stock price (short- and long-time price trends), and for more deep investigation and predictions they require the historical data about volumes of trading.

Let us consider how application of the described 3 financial analysis types depends on the stock market type (class).

4. Improvement of the procedure of stock market classification with the purpose of evaluation of financial analysis methods applicability

Following characteristics of the stock markets could be marking out influencing on the quality and availability of the necessary for decision-making information:
1) stock market activity degree (level);

2) stock market age;

3) the level of the economy development in the country;

4) information transparency[1].

Dependence sometimes existing between pairs of the first three criteria, in our opinion, is not regularity. Information transparency, as a rule, depends on the level of the economy development in the country (at the more developed economy information transparency is higher). At the same time stock market activity degree does not depend on stock market age (for instance, Russian stock market is very active, in spite of its relatively short history and crisis which took place in 1998, but Pakistan stock market having long history is not active [Zafar Ikbal Zahid 2001]). Stock market activity degree also not always depends on the level of the economy development in the country (as examples we can mention Russia, Portugal, Greece). Thereby, stock market classification could be made on the base of 1)-3). indices in 3-D space (Fig. 1). On the 3-D graph there are several examples of the countries' stock market positions [Siniavskaya 2006].
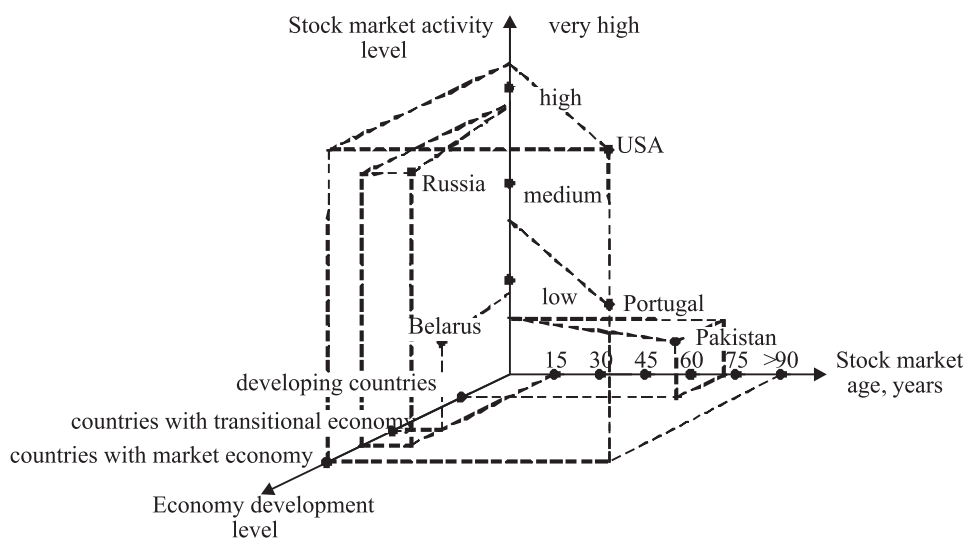

Fig. 1. 3-D classification of countries' stock markets

Source: [Siniavskaya 2006].

Let us mark out the following characteristics of the quality and availability of the necessary information for decision-making:

1) historical data availability;

2) current statistics availability;

3) data uncertainty level.

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[1] Information transparency means an availability of the information for all persons and subjects concerned. Information in our case includes stock market statistics and emitters' reporting.

Table 4. Stock market classification, characteristics of the available information and assessment of the different decision making methods acceptability on the different classes of stock markets

Classification criteria	Criteria's verbal values	Characteristics of the available information			Assessment of the decision-making methods acceptability	
		Historical data	Current accounting and statistics	Information uncertainty	Technical and indicator analysis	Fundamental analysis
Trading activity level	Low	Depend on stock market age	As a rule, available, but depend on information transparency	Very high	Give incorrect results	Applicable, **results qual-**ity depends on information transparency
	Medium			High	May be applied and give good results if uncertainty level is taken into account	
	High			Is present and depends on other factors		
Stock market age	New stock markets	Absent or they are not enough for making some conclusions on their base		High	Unacceptable or give incorrect results	
	Stock markets with long history	Available		Depends on other factors	May be applied and give good results, if there are no other conditions which make technical and indicator analysis unacceptable	
Economy development level	Emerging countries	Depend on other factors (in the first instance, on stock market age)	Depend on information transparency	Very high	Applicability depends on other factors and conditions	Applicable, **results qual-**ity depends on information transparency
	Countries with transition economy (post-socialist countries)	Ill-comparable and unauthentic due to frequent changes of the economic conditions	As a rule, available	Very high	In the most cases have low efficiency	Applicable and allows assessing of the emitter's and his securities investment attractiveness in log-term perspective
	Developed countries	As a rule, available	As a rule, available	Is present and depends on certain market peculiarities	May be applied and give good results if uncertainty level is taken into account	Results have low validity
Information transparency	Low	Absent or unauthentic	Is present, but access to them may be restricted or require payment	Very high	Unacceptable or give incorrect results	Applicable, but its carrying out require sizable time (sometime financial) expenses
	Medium	Depend on stock market age	As a rule, available, but their acquisition may require sizable time (sometime financial) expenses	High	Give very approximate and unauthentic predictions	
	High		Available for all	Minimal, but is present	Applicability depends on the price statistic availability, if it is available uncertainty is taking in account, these analytical methods give good results	Allow assessing of the emitter's and his securities investment attractiveness in log-term perspective with high validity level

Source: own elaboration.

In Table 4 matrix classification of the stock markets is represented on the basis of 4 above mentioned characteristics (criteria). For each stock market type qualitative values of the stock market information characteristics are defined [Siniavskaya 2006]. Possibility of financial decision-making methods application on the different stock market types is analyzed.

5. Conclusions

This investigation has allowed revealing of the particularities of decision making methods and procedures for the different types of stock markets. Also the conditions were defined under which traditional financial analysis methods are inapplicable, give bad (incorrect) results, and as a consequence, require modification or new suitable alternative ones working out. Suggested by the authors 3-D stock market classification allow concluding that under the combination of a number of conditions technical analysis and indicators are inapplicable due to necessary input data absence or unauthenticity. In such cases alternative financial analysis methodology is suitable called security scoring [Siniavskaya 2006; Zhelezko, Siniavskaya 2005], in which emitters fundamental analysis elements and discriminant analysis of available statistical stock market indices are combined.

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