

RIGA TECHNICAL UNIVERSITY

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**LATVIAN EQUITY MARKET VALUATION  
METHODS AND MODEL**

**Summary of Promotion Thesis**

**Riga -2007**

## **Introduction**

### **Topicality of research**

With Latvia's restoration of independence, a number of reforms required to establish and develop the market economy were undertaken. Over the recent years the Latvian national economy has stabilised, Latvia has successfully joined the EU and NATO, Latvian economy has proved its viability also in the conditions of crises - during the 1998 Russian crisis and also in the post-crises period, and has demonstrated good development trends at the time when global economy experienced serious problems. Thanks to the privatisation process and the established business environment, the volume of foreign investments accumulated in Latvia is gradually growing; the flow of investments in Latvia is comparatively stable, average annual increase of investment flow being 22.5%.

Latvia has ensured stable macroeconomic indicators. Inflation rate is gradually being reduced, in 2001 and 2002 it was among the lowest in Eastern Europe - 2.4 % and 1.9% respectively. The GDP growth in Latvia is one of the highest in the EU: in 2004 reaching 8.6%, and 10.2% in 2005, in 2006 its could be 12%. A negative indicator is the negative external trade balance, the excess of import over export still remains high; at the same time a positive development is gradual growth of export volumes. The credit rating assigned to Latvia by the international credit rating agencies "S&P" and "Moody's" is a confirmation to the stability of the economic situation in Latvia, which testifies to the high growth and creditability level of Latvia: Latvia ranks 12<sup>th</sup> among East European countries, considering its credit rating.

The negative external trade balance indicates to the fact that domestic companies are still insufficiently competitive in international markets and Latvian manufacturers have to still look for perspective development openings. The Latvian economy, the same as economies of the other Baltic States, is still new; the accumulated volume of private capital is still not sufficiently big for local companies to successfully compete with foreign counterparts.

As foreign experience demonstrates, strong positive support to the development of domestic national economy can be provided by the securities or equity market structure of the particular country. It is an additional possibility how to attract monetary resources of local and foreign investors for the development of national economy.

Irrespective of the good economic indicators, the the activity of he Latvian securities market is still very low. The development of the securities market is hampered by particular objective factors (low capitalisation and liquidity of the market, financial performance indicators of companies, the comparatively low income level of the population, etc.).

With the establishment of the market economy in Latvia it is relevant both for financial institutions and private investors in Latvia to appropriately use the existing valuation methods, taking into account the changing economic environment in Latvia. Proper mastery of using these techniques ensures a successful investment process and returns on investments. The share of capitalisation of the securities market against the GDP is gradually growing.

As compared against the average EU level, in Latvia the number of SMEs per 1000 of the population is low (in 2002, the figure for Latvia was 18, in a medium term it is planned to increase this number from 20-30, in the EU this indicator is 40-60). In a longer term, it is planned that the Latvian equity market (EM) will reach the average level of the EU member states, which allows to predict further growth of transactions with equity holdings in the future.

So far, there have not been any publications in Latvian on an in-depth research of investment valuation methods, creation and management of investment portfolios; there is no information amassed on the Latvian security market that would be publicly available. With the development of the domestic equity market a more focussed attention has to be devoted to appropriate application of business valuation methods.

Despite very low activity on the equity market, since this market is practically not represented by foreign investors, it may be forecasted that with the development of private pension funds and introduction of the 2<sup>nd</sup> -level pension system (funded pensions), the domestic security market will receive a considerable influx of monetary resources. With the development of the security market, the interest of local investors about valuation and principles of establishing the value of companies quoted on the stock exchange has also grown. In retrospect, the rapid rise in the prices on the Riga Stock Exchange in 1997 may be explained by the unprofessional approach of investors to the assessment of the situation; namely, stocks were bought without an in-depth analysis of companies. According to the author of this promotion thesis, the main factor that triggered the rapid increase in the prices of stocks of the companies and subsequently the fall in the prices was the low level of knowledge of local investors about the security market. The volume of accumulated foreign investments in Latvia is gradually increasing, at the same time a very insignificant part of these investments is accounted for by the Latvian securities market.

With the entry of foreign investors in Latvia, broader application of business and equity market valuation methods was started in transactions with companies equity holdings.

Application of these methods in developing markets should be effected considering the specifics of a particular country or region. When applying valuation methods, it is necessary to take into account the following indicators and specific features characterising the development of Latvian national economy and its equity market:

- ✓ Latvian economic environment is rapidly changing and developing;
- ✓ the development cycles and speed, depending on the economic situation, in EU member states and elsewhere in the world are different;
- ✓ industries and their structure have not established as yet, but capital redistribution and capital consolidation and restructuring is already taking place;
- ✓ statistical information about the securities market, financial situation of companies, impact of internal and external factors on the equity market is not sufficiently amassed and consolidated;
- ✓ the rapidly changing environment hampers risk assessment, which is an essential element in valuation of investments;
- ✓ qualification of companies' major stakeholders and corporate management.

The factors listed above have substantially influenced the activity of foreign investors. Trading with companies equity holdings will be one of the processes that will inevitably affect Latvia in the globalisation process. The processes of mergers and demergers have already affected Latvia; the number of acquisitions is increasing (e.g., the AVE Lat Group, the banking sector, companies quoted on the Riga Stock Exchange).

The problems of business valuation have been researched by many foreign authors, at the same time these studies do not consider the specifics of each particular market. All studies published are conducted in the countries with established market economies and sufficiently amassed statistics. In order to apply the methods investigated for valuation of Latvian companies and equity market, the author of this promotion thesis has conducted theoretical research of the problems referred to above. So far, there have been no publications in Latvia about practical research of the equity market and the application of business valuation methodologies under local conditions.

The research comprising a study of economic factors impacting the development of the Latvian equity market and application of business valuation methodologies considering local market the specifics contains relevant novelty elements.

### Goal and objectives of research:

1. The goal of the research is to establish the impact of economic factors on the Latvian equity market, market development, and return on investments.
2. To develop the model for valuation of the Latvian equity market and come up with the classification of factors.
3. To establish the level of risk and rate of return of the market correspondent to the economic situation in Latvia.

### In order to implement the goals set, the author has addressed the following objectives:

- Analysis of international and Latvian equity market and assessment of the situation;
- Specification of factors characterising the equity market, establishment of their impact on equity market indicators, assessment of these factors;
- Analysis and classification of most frequently applied business valuation methods;
- Establishment of the specifics of methods of establishment of the value of a company, as well as the impact of the method selected on the value of the company;
- Establishment of the value of shares of companies quoted on the Riga Stock Exchange, as well as economic factors and risk levels impacting the economic environment;
- Selection of internal and external economic factors and evaluation of the impact of these factors on the value of companies and the development of the security market;
- Consolidation of the research results.

The objects investigated are companies quoted on the Riga Stock Exchange, as well as the Latvian and international equity markets.

### Subject of the research:

The subject of the research presented in the promotion thesis is equity market and factors impacting this market. The research undertaken is subject to the following conditions and limitations:

- Initial data used in valuations must be sufficiently stable and predictable;
- The research is confined only to the companies quoted on the Riga Stock Exchange;
- The companies selected have maximally long operation history and statistical information, so that the results derived at would be possibly accurate.
- The research is based only on the publicly available information available to the maximum number of potential investors.

### Assertions to be substantiated by the promotion thesis:

- Necessity of development of the model of valuation of the Latvian equity market.
- Elaboration of the criteria for selection of the most appropriate model of calculation of the value of a company.
- Selection of economic factors impacting the equity market rate, use of these factors for establishing the market trend.

- Application of multivariate regression models for establishing the value of the Latvian equity market and companies. Necessity to elaborate a mechanism for application of the Equity Market Model.

#### Scientific novelty of research

The novelty of the research is establishment of the impacts of economic factors on the development of the equity market and the value of companies.

The most relevant novel elements of the research are:

- 1) The author has formulated a set of valuation methods for establishing the value of companies and the security market to be applied when appraising companies in Latvia (pp. 52 - 69; p. 71).
- 2) The author has selected and assessed economic factors, which, according to the author, have to be used when establishing the value of companies and the securities market (pp. 71, 172, 181, 192).
- 3) The author has established and selected parameters, which impact the selection of the particular valuation method (pp. 115,116,117,119,120)
- 4) Elaboration of the risk-free rate and the security market multivariate linear regression model, and selection and evaluation of factors impacting the security market (p. 206).
- 5) Elaboration of the model for evaluation of the rate of return of the equity market (p. 208).
- 6) Definition of specific economic factors (Annex 11).

#### The research leading to the promotion thesis has allowed obtaining the following relevant results:

- By using the elaborated five-factor regression model Rf 5 mod, the forecast of risk-free rate for Latvia for 2006 was made, the obtained annual value of the rate is 3.95% (Annex 13).
- By using the elaborated three-factor regression model Vp3 mod for the security market rate, the author has calculated the growth rate of equity market for 2006, the growth rate of equity market is negative - 10.87% (Annex 15).
- The promotion thesis presents the procedure for establishment of the rate of return; the value of the rate obtained is 11,75%. The rate can be used for calculating the value of companies and shares.
- The multi-factor regression models can be used for forecasting risk-free rates and fluctuations of rate of return of equity market for the period up to 2 years.
- For long-term investments in the shares of Latvian companies and the share market it is necessary to use the established capital market rate of return.

#### Methodological substantiation and approbation of the research

The promotion thesis draws on the application of qualitative and quantitative research methods accepted by the science of economics, the statistical method, simulation method, questionnaires and forecasting methods, as well as analysis of theoretical materials published by foreign authors. The author of the promotion thesis has also used the results of research conducted by foreign and Latvian authors.

The author of the promotion thesis has participated in 7 scientific conferences and seminars. In the course of elaboration of the promotion thesis the author has published 11 scientific articles, incl. 6 published in reviewed and internationally recognised publications.

Articles in generally recognised international reviewed publications:

1. Kimmelis J., Magidenko A. Role of the Latvian capital market in attracting new investments.// Development of production in a transitional period./ Scientific conference proceedings. - R, RTU, 2000. - pp.74. - 82.
2. Kimmelis J. Possibilities for formation of investment portfolios in the Latvian security markets.// Economics and Entrepreneurship. Entrepreneurship and Management. 3rd series, Volume 2. RTU Proceedings. - R.: RTU, 2001. - pp. 9. - 20.
3. Kimmelis J. Investment risk assessment in the Latvian equity market. // Role of engineering economics in the development of entrepreneurship. International conference proceedings. - R.: RTU, 2002. - pp. 70. - 80.
4. Kimmelis J., Magidenko A. Application of valuation methods for establishment of the value of company shares in the Latvian equity market. // Role of engineering economics in the development of entrepreneurship. International scientific conference proceedings. -R.: RTU, 2002.-pp. 61-69.
5. Kimmelis J. Impact of economic factors on the level of risk in the Latvian share market. // Problems of national economy and education in the contemporary period. International scientific conference proceedings. -R.: RTU, 2003. -pp. 110-123.
6. Kimmelis J. Impact of economic factors on the Latvian equity market. // Competitiveness and quality management problems. International scientific conference proceedings. - R: Banking Institution of Higher Education, 2000. - pp. 114-119.

Other publications:

7. Kimmelis J., Magidenko A. Share market indexes. // Proceedings of the 36th RTU Students scientific Conference. - R.: RTU, 1998. - p. 202.
8. Kimmelis J., Magidenko A. Optimisation of the Riga Stock exchange indexes. Economic problems in Entrepreneurship. International university proceedings. - R.: RTU, 2000. -pp. 57-62.
9. Kimmelis J., Magidenko A. Basic principles of building up an investment portfolio. // Economic problems in entrepreneurship. International university proceedings. - R.: RTU, 1998. - pp. 68-74.
- 10.Kimmelis J. Role of the Latvian equity market in attracting new investments. // Development of production in the transition period. International scientific conference proceedings of summaries of presentations. - R.: RTU, 1999. - 38.1pp.
- 11.Kimmelis J. Assessment of investment risk in the Latvian equity market. // Role of engineering economics in the development of entrepreneurship. International scientific conference proceedings. - R: RTU, 2000. - p. 16.
- 12.Kimmelis J., Magidenko A. Application of valuation methods in the Latvian equity market. // Role of engineering economics in the development of entrepreneurship. International scientific conference proceedings. - R: RTU, 2000. - p. 17.
- 13.Kimmelis J. Impact of economic factors on the risk level of the Latvian share market. // Problems of development of economy and entrepreneurship in the contemporary period. International scientific conference. - R.: RTU, 2002.
- 14.Economic substantiation methodology of innovations in the transitional period. // Latvia Science Council principal research in economics and juridical science. No. 6, Riga, 2001. Co-authors: A. Magidenko, L.Ribickis, K.Didenko, J. Kimmelis, etc. - pp. 81-86.

15. Kimmelis J., Magidenko A. Role of export products in the development of entrepreneurship. // Economic problems in Entrepreneurship. Scientific proceedings. Synopsis of presentations. -R.:RTU, 1996. -pp. 68-71.
16. Kimmelis J. Model of applying equity market valuation methods in Latvian conditions. // Problems of development of national economy and entrepreneurship. International scientific conference. - R.: RTU, 2005. - p. 50.
17. Kimmelis J. Innovations and an innovative approach in business valuation methods. // Development of knowledge-based innovative entrepreneurship. International scientific seminar. Synopsis of presentations. Riga, RTU, p.19.

*The author has participated with publications in the following conferences:*

1. Development of production in the transitional period. International scientific conference, R.: RTU, 1999.
2. Role of engineering economics in the development of entrepreneurship. R.: RTU, 2000.
3. Problems of development of national economy and education in the contemporary period. R.: RTU, 2002.
4. RTU 39th Students Scientific Conference. R.: RTU, 1998.
5. Competitiveness and quality management problems. International conference. Banking Institution of Higher Education, 2000.
6. Problems of development of national economy and entrepreneurship. International conference. R.: RTU, 2005.
7. Development of knowledge-based innovative entrepreneurship. International scientific seminar, R.: RTU, 2006.

In 2006, the author of the promotion thesis has participated in the research project of the LR Ministry of Education and Science No. 7076 "Development of knowledge-based innovative business in Latvia".

The author of the promotion thesis has participated in the research project of the Latvian Academy of Sciences "Methodology of economic substantiation of innovations in the transitional period" for 1999-2000. The research results had also practical relevance for valuation and management of investment portfolios, thus contributing to the development of the Latvian security market.

#### Materials and information sources used in the research

The author of the research has used Latvian and foreign statistical data, unpublished information sources of various state and public institutions, proceedings of different scientific conferences and seminars and conclusions gained from these conferences and seminars; the research is also based on the experience of the author in valuation of businesses and capital market and investment management.

#### In his research the author has used the following principally relevant sources of information:

Data of the Latvian Central Statistics Board and the LR Ministry of Economics; published and unpublished data of the Riga Stock Exchange and the Latvian Central Depository; foreign statistical information and analytical materials, information collected by financial institutions; and information published in the Internet.

In his research the author has used the methods of synthesis and analysis, as well as logically constructive and mathematical statistical valuation methods. The analysis of the equity market and valuation methods are extensively dealt with by foreign authors, some attempts are also made by Latvian authors. These authors have naturally had a certain impact on the research and publications by the author of this promotion thesis. Most relevant Latvian and foreign researchers and authors are: W.F.Sharp, R.Stephen, A.D'Amodaran, F.Reilly,

K.Brown, G. Alexander, J. Bailey, E.Harvey, R.Brealey, S. Mayers, R. Ibboston, D.Thompson, E.Fama, S.Ross, J.Gahlon, K.Didneko, O.Krastiņš, R. Poes, N.Baranovskis, A.Magidenko, V. Jansons, N. Lāce.

#### Practical relevance of the promotion thesis:

The elaborated equity market valuation model is approbated and positively assessed by several commercial banks and investment management funds, e.g. JSC "SEB Unibanka", JSC "Latvijas Krājbanka", IF JSC "LKB Asset Management", IF JSC "Astra Fondi", and "Alfa Finance" Ltd.". The activity of these financial institutions in the domestic equity market is directly dependent on the quality of valuation of businesses. The author of the promotion thesis has participated in the elaboration of legislation and rules governing the Latvian security market, and has participated in the establishment of private pension funds. The methods proposed in the promotion thesis are approbated by participating in scientific conferences and in publications; the methods developed are applied in practical work of management of private pension funds, as well as in pedagogical work and practical consultations provided to clients and businesses.

The problems dealt with in the promotion thesis will be relevant also when appraising investments abroad. With the development of corporate financial transactions, valuation of businesses will become topical not only for transactions of acquisitions, sale or mergers, but it will also be easier for corporate management to evaluate development opportunities of the company, taking strategically significant decisions. Valuation of businesses, in conjunction with the evaluation of the development of the equity market and appraisal of the situation, will be the decisive factors, which will influence the development of the domestic equity market and creation of a more attractive investment environment.

#### *Structure and scope of the promotion thesis*

The promotion thesis comprises Introduction, six chapters, Conclusions and Recommendations, Sources of Reference, and Annex. The total scope of the promotion thesis is 232 pages, excluding annexes. The promotion thesis includes 64 tables, 44 figures, and 24 annexes, which explain and illustrate the content of the research conducted. The list of sources of reference contains 130 different sources used in the elaboration of the promotion thesis.

The promotion thesis has the following structure; Abbreviations used in the promotion thesis, Introduction

1. CONCEPT AND FUNCTIONS OF EQUITY MARKET
  - 1.1.CHARACTERISTICS OF INTERNATIONAL EQUITY MARKET AND ANALYSIS OF THE MARKET SITUATION
  - 1.2.CHARACTERISTICS OF LATVIAN EQUITY MARKET SITUATION AND ANALYSIS OF DEVELOPMENT
2. EVALUATION AND SELECTION OF METHODS OF APPRAISAL OF EQUITY MARKET
  - 2.1.EVALUATION OF APPLICABILITY OF THE ARBITRAGE PRICING THEORY (APT) BASED CALCULATION METHOD IN LATVIAN MARKET CONDITIONS
  - 2.2.EVALUATION OF ECONOMIC FACTORS AND THEIR IMPACT ON THE RISK LEVEL OF THE LATVIAN EQUITY MARKET
  - 2.3.ASSESSMENT OF INVESTMENT RISK LEVEL AND EVALUATION AND SELECTION OF RISK ASSESSMENT METHODS
  - 2.4.DEVELOPMENT AND APPLICATION OF THE LATVIAN ECONOMIC ENVIRONMENT RISK ASSESSMENT MODEL
3. FORMATION OF INVESTMENT PROCESS AND SELECTION OF INVESTMENT POLICY
  - 3.1 .SELECTION OF SECUTITIES FOR BUILDING UP INVESTMENT PORTFOLIOS
  - 3.2. SELECTION OF METHODS AND PARAMETRES FOR ASSESSMENT OF RETURN ON INVESTMENTS



3.3.	MODELLING OF AN OPTIMAL INVESTMENT PORTFOLIO
3.4.	MANAGEMENT OF INVESTMENT RESULT AND COMPARISON AND ANALYSIS OF METHODS FOR ASSESSING A POSSIBLE INVESTMENT RISK LEVEL IN LATVIAN CONDITIONS
4.	COMPARISON AND EVALUATION OF APPLICABILITY OF BUSINESS VALUATION METHODS IN LATVIAN CONDITIONS
4.1.	ASSESSMENT AND SELECTION OF CRITERIA FOR SELECTING BUSINESS VALUATION METHODS
4.2.	SEQUENCE OF VALUATION OF COMPANIES BY APPLYING THE CASH FLOW ASSESSMENT METHOD
5.	EVALUATION OF LATVIAN ECONOMIC SITUATION AND EQUITY MARKET
5.1.	EVALUATION OF THE IMPACT OF ECONOMIC FACTORS ON THE DEVELOPMENT OF THE LATVIAN EQUITY MARKET
5.2.	ANALYSIS OF THE DEVELOPMENT TREND OF THE LATVIAN EQUITY MARKET
6.	EQUITY MARKET VALUATION MODEL AND VALUATION OF SHARES OF COMPANIES QUOTED ON THE RIGA STOCK EXCHANGE
6.1.	DEVELOPMENT OF AN OPTIMAL SECURITIES MARKET REGRESSION MODEL BY APPLYING MULTIVARIATE REGRESSION ANALYSIS
6.2.	MODELLING AND ESTABLISHMENT OF THE RISK-FREE RATE REGRESSION MODEL
6.3.	MODELLING AND ESTABLISHMENT OF THE SECURITIES MARKET RATE MODEL
6.4.	MODELLING AND ESTABLISHMENT OF COMPANY'S RATE OF RETURN MODEL
6.5.	SUMMARY OF THE RESULTS OF REGRESSION ANALYSIS OF THE MULTIVARIATE REGRESSION EQUITY MARKET VALUATION MODEL
6.6.	APPLICATION OF THE DEVELOPED SECURITIES MARKET VALUATION MODEL FOR VALUATION OF THE SECURITIES MARKET AND INDIVIDUAL COMPANIES
	CONCLUSIONS AND RECOMMENDATIONS
	SOURCES OF REFERENCE

### *I. Concept and functions of the capital market*

With Latvia's restoration of independence and establishment of the market economy, the equity or securities market also commenced its gradual development, which, according to the author's opinion, constitutes one of the most relevant elements of the market economy. By using the possibilities offered by the equity market the national economy of the country receives financing necessary for the development of individual enterprises and national economy on the whole.

This is one of the simplest ways in which enterprises can attract both foreign investments and financing from pension funds and private investors. It is owing to huge capitalisation of the market and liquidity that investors continue investing in developed markets. Another relevant factor is that this market and the whole equity market structure and operation are well established and known. The next factor is that advanced economies do not want monetary funds to be invested in other regions and countries, therefore key markets are considered to be the USA, Western Europe, and Japan. However, over the recent years developing markets continue attracting increasingly bigger monetary resources.

#### *1.1 Characteristics of the global equity market and analysis of the market situation*

In order to characterise and explain the processes taking place in the Latvian securities market, according to the author, it is relevant to study the experience and history of establishment of foreign equity markets, as well as select factors that exert impact on the events in global securities markets.

Practically all major markets are based in advanced countries, and only Taiwan and China have managed to secure themselves in the highly positioned 4<sup>th</sup> place by their market turnover. If these equity markets' indicators are compared with the Latvian equity Latvia, or even with the whole Baltic States equity market, the latter would hardly be noticeable at all. The conclusion is that the main problem why there are no big foreign investors on the Baltic market is the comparatively small capital intensity of these markets. However, despite small capitalisation of the emerging markets, these markets are increasingly demonstrating

themselves as serious investment regions. The role of the equity market in attracting investments is testified by total equity market capitalisation volumes. In 1999, capitalisation of total global equity market accounted for USD 27 462 113 mln., at the same time, at September 2006, this indicator was already USD 43 909 164 mln. Over the last 30 years, institutional investors have concentrated in their hands the biggest market share, therefore it may be concluded that these market participants are key players in determining global equity market processes and development trends.

Several markets are comparatively large, considerably larger than some developed markets. The size of capitalisation of these markets does not always show the real situation and prospects of these markets. It has to be remembered that investments in these countries are to a great extent influenced by the macroeconomic factors (inflation, interest rates, currency rates, etc.), as well as legislation, investor protection and quality of market supervision.

The data presented in Table 1 show that share markets in emerging economies are characterised by very different values of main characteristic indicators. This indicates that each of these markets is very specific and investors' evaluation of each particular market is different. Investors forecasts about the development trends of each particular market are also different. The regions showing higher risk levels, but at the same time also higher returns, are the markets in Latin America. According to the author, it is directly related with the high economic and political risk of the region.

Figure 1 shows the dynamics of fluctuations of different branch indexes of economies of emerging markets in 2005 and 2006. It can be seen that the biggest growth was manifested by power engineering, which is due to the rising demand for energy resources. The author relates the price increase in the mining industry with the prices for oil, natural gas and other natural resources. When evaluating fluctuations of share prices in different branches of national economy, it has to be concluded that the biggest fluctuations since 1999 have been manifested by the technology sector, the unprecedented price hike in 1999 and at the beginning of 2000 triggered a price rise of shares in all world markets.

However, with deterioration of the the world economic situation, this was the branch that also caused the drop in share prices in other branches. At the end of 1999, the global market rose to the highest position ever. The market trend has been positive since 1984, very positive since 1989, and is still positive since 1995.

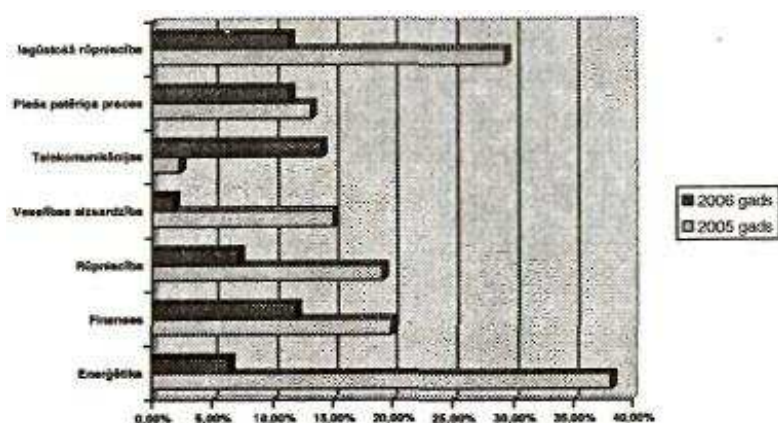


Figure 1. Dynamics of increase of national economy branch indexes in 2005

Table 1  
Major equity markets in the world in 2004

Country	P/E	P/BV	Dividend yield, %
<b>Latin America</b>			
Argentina	13.22	1.25	4.03
Brazil	7.08	0.60	7.23
Chile	14.77	1.17	4.20
Mexico	21.31	1.44	2.97
Peru	21.07	1.56	3.83
<b>East Asia</b>			
China	12.74	1.02	0.96
South Korea	-50.69	0.92	0.62
Taiwan	21.49	2.63	0.84
<b>South Asia</b>			
India	11.46	1.75	1.91
Indonesia	108.81	1.66	0.83
Malaysia	19.89	1.29	2.53
Thailand	-6.45	1.49	0.75
<b>Europe, Middle East, Africa</b>			
Check Republic	48.17	0.81	0.17
Egypt	8.64	2.74	6.75
Hungary	17.02	3.21	1.07
Israel	13.18	1.21	- 1.91
Morocco	19.52	3.37	2.03
Poland	9.17	1.34	1.52
Russia	10.39	0.62	1.12
Slovakia	7.37	0.31	3.83
Turkey	7.80	2.74	4.34

In the fall of 1994, *the Dow Jones Industrial Average* listed only 4000 points; at the beginning of April 2000, the value of DJIA was 11111 points; at the same time, in the middle of 2002, the indexes of leading stock exchanges fell to the lowest level in 5 years; the DJIA index reached the highest level in September 2006 - 12176 points.

Table 1 presents a summary of information about the values of companies dividend yield (DY) and share price-earnings (P/E) ratio in leading equity markets, which are calculated taking into account corporate profit forecasts for 2006. As can be seen in Table 2, practically all companies quoted on the leading stock markets demonstrate similar P/E levels. This indicates to the leveling off of returns on global equity markets. The lowest DY level is on the Swiss equity market, which is explained by the comparatively low level of risk in this market.

The summary of everything mentioned above allows to conclude that the uncertainty observed in global equity markets is still rather big. So far, the USA and European countries

have failed to demonstrate reliable economic growth indicators. It can be forecasted that such a market situation will also maintain in the next 2-3 years.

Table 2  
Forecast of basic major equity markets indicators P/E and DY for 2006

Country	DY	P/E 2006
World	2.2%	14.6
Europe	2.9%	13.1
Switzerland	1.7%	15.5
Germany	2.4%	13.1
France	2.7%	12.7
Italy	3.9%	12.8
Great Britain	3.3%	12.5
Japan	1.1%	18.5
Emerging markets	2.4%	12.1

Negative impacts affecting the global equity market:

According to the evaluation of the author of this promotion thesis, the following factors impact the development and price fluctuations of the global equity market:

- √ *Share prices on the stock exchanges twice exceed book value of equity;*
- √ *The level of P/E has approached maximal historical values;*
- √ *Dividend yield ratio is close to the lowest historical level;*
- √ *Active speculation;*
- √ *Reduction of profitability level of companies;*
- √ *Drop in industrial efficiency.*

*1.2 Characteristics of Latvian equity market situation and analysis of development*

As can be seen from Table 3, in 2000, total sales accounted for LVL 555.7 mln., which was the highest indicator in the period from 1996 - 2000. The increase in sales was due to inclusion of demand securities in the stock exchange lists, as well as because of several successful stock auctions. However, since 2001, there is a drop in sales, so, in 2005, stock market sales accounted for only LVL 54.1 mln.. One of the factors responsible for the fall in sales is the fact that local investors have bigger possibilities to place their free financial assets in foreign equity markets. Presently globalisation in the world is manifesting itself both as globalisation trends and globalisation processes. This is sure to affect the Baltic States equity markets and thus also the Latvian securities market.

Table 3  
Basic Riga Stock Exchange performance indicators

Year	1998	1999	2000	2001	2002	2003	2004	2005
Total sales, (mln. LVL)	50.4	29.3	555.7	531.3	310.9	230.0	166.2	59.2
Share market	50.41	25.23	168.4	103.2	110.9	84.3	61.8	54.1
Demand securities market	-	4.15	387.2	428.1	200.0	145.6	104.4	5.1
Total capitalisation (mln. LVL)	391.4	512.7	348.0	438.5	418.3	608.2	616.6	850.5

## 2. Evaluation and selection of methods of appraisal of equity market

Currently there are two generally known theories, which show how to establish relations between risk and return:

- 1) Capital Asset Pricing Model (CAPM); and
- 2) Arbitrage Pricing Model (APT).

According to CAPM, systematic risk depends on the general market situation, usually characterised by particular shares (e.g., S&P500). This is, in its turn, related with shares through  $\beta$  coefficient.

The APT model defines that there is a definite way how to establish systematic risk. If APT is more general and does not accurately define what exactly systematic risk is and whether such risk exists, academic and commercial research recommends considering several primary risk sources, which affect rate of return on shares. These risks occur due to unexpected changes in some economic parameters, such as:

- ✓ *investors confidence;*
- ✓ *interest rate;*
- ✓ *inflation;*
- ✓ *actual business activity*
- ✓ *market index.*

### 2.1. Evaluation of applicability of the arbitrage pricing theory (APT) based calculation method in Latvian market conditions

There are three approaches with regard to establishment of the APT model:

- 1) risk factors  $f_1(t), f_2(t), \dots$ , can be calculated using statistical methods - analysis of factors and main components;
- 2)  $K$  - these factors may be substituted by some well-differentiated portfolios;
- 3) the economic theory and knowledge about the financial market can be used to establish risk factors  $K$ , which are evaluated, by using available macroeconomic and financial data.

Each of these assumptions has its own value and they can be subject to definite types of analysis. Especially, in approach (1) it is usually assumed that  $K = 5$ , since all calculation methodologies use 5 key risk factors. It is considered that it is sufficient for establishing the required rate of return on shares.

Selection of macroeconomic parameters is rather an art than science; in this case it is difficult to draw the line. Practically the required factors used are easier to interpret and can as much as possible be related to the possible rate of return on shares.

Extensive research has allowed ranking risk factors in the following sequence:

- ✓  $f_1(t)$  Confidence risk;
- ✓  $f_2(t)$  Time Horizon Risk;
- ✓  $f_3(t)$  Inflation Risk;
- ✓  $f_4(t)$  Business Cycle Risk;
- ✓  $F_5(t)$  Timing Risk.

In contrast to valuation methods applied to foreign investments, when establishing the risk level, the author puts special emphasis on the investment time horizon risk. These risks are especially topical in the Latvian market, since the time horizon risk is very different with regard to long-term and short-term interest rates. In order to establish the required risk level, the author highlights liquidity risk as another topical and essential risk factor, since the Latvian equity market has very low liquidity, which creates a very high risk; this risk level has to be established for each particular security separately.

## 2.2. Evaluation of economic factors and their impact on the risk level of the Latvian equity market

When performing valuation of companies and establishment of equity market rate of return, it is important to appropriately establish future parameters of the share market to identify the value of future risk, dynamics of equity market, etc. It is possible to use the collected statistical data, however, some foreign authors consider that historical data of new markets can hardly be used for evaluation of these emerging markets. Therefore, one of the possibilities is to use historical data of US or other global equity markets. In order to examine this approach and assess the applicability of historical statistical data accumulated by the Riga Stock Exchange, these data will be used for calculating the rate of return of the Latvian equity market by applying several calculation methods. The results obtained will be compared with historical statistical data of the US securities market.

In practice, there are four different approaches to the establishment of share market risk premium:

Approach I: Share market risk premium is established by using historical statistical data about the difference between the rates of return on shares and bonds.

Approach II: Share market risk premium is established by using information of fundamental analysis (e.g., rate of return, dividends, or such economic indicators as productivity etc.).

Approach III: Share market risk premium is established by using indicators or parameters that characterise demand. The forecasted equity rate of return is established, taking into account the required cash flow to be paid out to investors, so that investors would be interested in undertaking the risk by investing in the equity market. Advocates of this approach also here also include the use of CAPM and APT methods.

Approach IV implies reliance on the financial analysts' opinion, as well as on the analysis and forecasts made.

When making calculations according to a similar algorithm, two approaches can be used with regard to the Latvian market - an approach to base calculations only on Latvian equity markets and data, or to take historical US equity market data as average equity market rate of return.

### Equity market valuation methods

#### 1. Factor combination method

Key factors: inflation, risk-free rate, equity market risk premium (ERP). Real risk-free rate RRT for equity market risk premium ERP is calculated as follows:

$$ERP_t = \frac{1 + R}{1 + Rf} - 1 = \frac{R - Rf}{1 + Rf}, \quad (1)$$

$$RRf_t = \frac{1 + Rf}{1 + CPI} - 1 = \frac{Rf - CPI}{1 + CPI}, \quad (2)$$

$$E_t = (1 + CPI) \times (1 + RRf) \times (1 + ERP) - 1, \quad (3)$$

Where  $R_t$  - rate of return of equity market, which is reflected by the stock exchange index;  
 $R_{ft}$  - rate of return on risk-free assets, rate of return on long-term promissory notes (in calculations it is the assumed yield to maturity of 5-year bonds);  
ERP- equity market risk premium  
CPI<sub>t</sub> - inflation rate.

## 2. Capital Gains and Income Method

Return on equity can be divided into capital gain (Rcg) and income (Inc), expressing income by type. Income from ordinary shares are received as dividends, at the same time, profit from capital is received from an increase of value of shares. By using this method, capital gain rate is established by adjustment of the increase of the value of shares with inflation rate. Rate of return on shares can be calculated by formula 4:

$$R = [(1 + CPI) \times (1 + Reg) - 1] + Inc + Rinv, \quad (4)$$

where CPI- inflation rate

Rcg - real growth of capital gain;

Inc - growth of rate of return on income received by investors in dividends;

Rinv - growth of reinvested profit.

## 3. Rate of return method

By applying this method rate of return on capital is divided into growth of rate of real profit (gREPS) and growth of price - earnings ratio (gP/E). Real rate of return on equity can be calculated as shown in formula 5 below:

$$R_{cg_t} = ((1 + g_{P/E,t}) \times (1 + g_{REPS,t}) - 1) + Inc_t + Rinv_t, \quad (5)$$

where Rcg<sub>t</sub> - rate of real capital gains;

g<sub>REPS</sub> - growth of rate of return;

g<sub>p/E</sub> - growth of P/E ratio;

Inc - growth of rate of return on income received by investors as dividends;

Rinv - growth of reinvested profit.

The rate of return of equity market can be divided into four components: inflation, increase of real profit per one share, growth of P/E ratio, and return on the dividends received. The rate of return of the market can be calculated according to formula 6 below:

$$R = [(1 + 1CPI) \times (1 + gREPS) \times (1 + gP/E) - 1] + Inc + Rinv, \quad (6)$$

where CPI- inflation rate;

g<sub>REPS</sub> - growth of profit per one share;

g<sub>p/E</sub> - growth of P/E ratio;

Inc - growth of rate of return on income received by investors as dividends;

Rinv - growth of reinvested profit.

## Method 4: The dividend method

The application of this method is substantiated by the fact that the amount of dividends paid out is proportionally equal to the payout ratio. Growth of rate of return can be calculated as the difference between the rate of growth of dividends and growth of dividend payout ratio (PO).

Total rate of return of equity market can be subdivided into: 1) inflation, 2) growth of P/E ratio, 3) amount of dividends to be paid out after inflation adjustment, 4) growth of dividend payout ratio, 5) dividend yield.

The rate of return of equity market can be calculated by the following formula:

$$R_t = \left[ (1 + CPI) \times (1 + g_{P/E}) \times \frac{(1 + g_{RDiv})}{(1 + g_{PO})} - 1 \right] + Inc + Rinv, \quad (7)$$

Where CPI- inflation rate;

$g_{P/E}$  - rate of growth of P/E ratio;

$rRDiv$  - real growth of rate of return on dividends;

$gPO$  - growth of dividends payout ratio;

$Inc$ - growth of rate of return on income investors receive as dividends;

$Rinv$  - growth of reinvested income.

#### 5. Model of return on share capital

When applying this method, rate of profit per share (EPS) is divided into two components: 1) value of share capital (BV); 2) rate of return on equity (ROE).

$$EPS = BV \times ROE, \quad (8)$$

where EPS- profit per share; BV- book value of shares; ROE - return on equity.

Growth of profit per one share can further be calculated by using growth of BV and ROE. Total rate of return of equity market can be calculated using the following formula:

$$R = 1(1 + CPI) \times (1 + g_{P/E}) \times (1 + g_{RBV}) \times (1 + g_{ROE}) - 1 + Inc + Rinv \quad (9)$$

where CPI - inflation level;

$g_{P/E}$  - rate of growth of P/E ratio;

$g_{RBV}$ -real growth of BV;

$g_{ROE}$  - growth of return on equity;

$Inc$  - growth of return on income investors receive as dividends;

$Rinv$  - growth of reinvested profit.

#### 8. GDP growth model

This method suggests a completely different approach. In all methods considered above used initial data characterising company's profitability indicators and rate of return on equity. This method is based on the economic growth rate of a particular country.

Rate of return of equity market is divided into the following components: 1) inflation; 2) real growth rate of the economy of the country (per capita GDP); 3) growth of the equity market share in economy; 4) dividend yield. The calculation formula according to this method is the following:

$$R = [(1 + CPI) \times (1 + RgIKP/POP) \times (1 + gFS) - 1] + Inc + Rinv \quad (10)$$

where CPI - inflation rate;

$RgIKP/POP$ - per capita GDP growth rate;

$gFS$  - growth of the equity market share in economy;

$Inc$  - growth of return on income investors receive as dividends;

$Rinv$  - growth of reinvested profit.



### 7. Profit forecast method

The method is based on the assumption that the existing increase of rate of return will be maintained at the current level, at the same time investors forecasts will remain unchanged. Rate of return of equity market (SR) is formed by inflation, increase of rate of return per share, and rate of return of income.

$$SR = [(1 + CPI) \times (1 + gREPS) - 1] + Inc + Rinv \quad (11)$$

where CPI - inflation rate;  
gREPS- growth of rate of return per share;  
Inc- growth of rate of return on income investors receive as dividends;  
Rinv - growth of reinvested profit.

Equity market risk premium is calculated by using the following formula:

$$SERP = \frac{(1 + SR)}{(1 + CPI) \times (1 + RRf)} - 1, \quad (12)$$

where CPI - inflation rate;  
SR - forecasted rate of return of equity market;  
RRf- real risk-free rate.

### 9. Method of forecasted dividend amount

The method of forecasted dividends amount is used for the stable dividend growth model (the Gordon Growth Model). This model derives from the assumption that the forecasted rate of return of equity market is equal to the sum of dividend yield and planned growth of dividends. The Gordon Growth Model is calculated by including inflation, real dividend growth, dividend yield. This model uses the anticipated dividend flow. The calculation uses real rate of return of dividends in the calculation period (Inc) 3.67% instead of average historical value of dividend yield 4.22%, as a result of which the forecasted rate of return of equity market reduces.

$$SR = [(1 + CPI) \times (1 + gRDiv) - 1] + Inc + Rinv, \quad (13)$$

where CPI- inflation rate;  
rRDiv - real growth of dividend yield;  
Inc - growth of return on income investors receive as dividends;  
Rinv - increase of reinvested profit.

### 9. Forecasted GDP growth method

This method is based on the assumption that rate of return is directly related with total growth of the respective economy. The model establishes the forecasted rate of return of equity market, substantiating it by the growth of economy. The growth of equity market may not substantially exceed or lag behind gross economic growth. This method is calculated by using the following formula

$$SR = [(1 + CPI) \times (1 + gGDP/POP) - 1] + Inc + Rinv \quad (14)$$

where CPI - inflation rate;  
RgIKP/POP- per capita GDP growth rate;

Inc- growth of return on income investors receive as dividends;  
Rinv - growth of reinvested profit.

Taking into account that the Latvian securities market is still in a developing stage and there is no statistical information accumulated over a sufficiently long period, the author considers that the required rate of return of the Latvian equity market has to be established as an average value of all calculation methods considered in this chapter, establishing the weight of each method separately.

$$R_{VPT} = \sum_{i=1}^n \omega_i \cdot R_{VPTMi} , \quad (15)$$

where  $R_{VPT}$  - established rate of return of securities market;  
 $\omega_i$  - weight of the method used in calculations  
 $R_{VPTi}$  - value of rate of return of the securities market calculated by applying the  $i$ -th method.



### 2.3. Assessment of investment risk level and evaluation and selection of risk assessment methods

For establishing the rate of capital costs for a definite company, it is necessary to establish the following parameters:

- ✓ existing risk-free rate;
- ✓ forecasted growth of equity market;
- ✓  $\beta$  of the company to be analysed.

The risk-free rate refers to currency of investment. In practice, historical rate of return is used, i.e. historical equity market rate of return, which exceeds the risk-free rate. Historical data are dependent on a number of factors:

- ✓ the length of the time period historical data cover;
- ✓ aggregated historical rate of return of bonds;
- ✓ geometrical or arithmetical value applied.

In Latvian conditions historical rate of return on equities and government bonds are available only for the previous 9 to 10 years. In order to accurately calculate the possible standard deviation of risk-free rate, standard deviation of fluctuations is applied. Table 5 presents summary data about standard deviation of RIGIBOR rates. In the Latvian market, longer-term rates demonstrate better stability. Short-term rates are subject to comparatively big fluctuations.

Table 5  
Standard deviations of RIGIBOR rates

Year	Standard deviation of RIGIBOR rates			
	1 month	3 months	6 months	12 months
1996	0.87%	0.75%	1.04%	1.25%
1997	1.99%	1.77%	2.03%	1.77%
1998	1.49%	1.36%	1.20%	1.42%
1999	0.51%	0.34%	0.36%	0.58%
2000	0.57%	0.31%	0.20%	0.23%
2001	0.69%	0.51%	0.43%	0.28%
2002	0.48%	0.47%	0.47%	0.51%
2003	0.26%	0.15%	0.10%	0.07%
2004	0.24%	0.18%	0.13%	0.13%
2005	0.57%	0.51%	0.44%	0.37%

Table 6 presents a summary of the data on annual return of official indexes of the Riga Stock Exchange RICI and DJRSE shown in the previous years, in comparison with rate of return on government bonds. As can be seen from Table 6, historical rate of return of indexes is negative; to avoid distortion of the results, it is recommended to exclude the rates of return of indexes of 1997 from the data under consideration.

Risk premium, which characterises the desirable rate of return in the Latvian equity market, is defined as the difference between rate of return of historical equity market and rate of return of bonds issued by the government.

When establishing risk premium of equity market, the rates obtained for the DJRSE index and the RICI index are different. It is recommended to use the RICI index, since fluctuations of

this index are smaller and this index more appropriately reflects the trends in the Latvian securities market. When analysing Latvian firms, it is necessary to consider the following parameters:

- ✓ rates of government bonds denominated in LVL;
- ✓ rates of government bonds denominated in USD;
- ✓ interest rates effective for US federal bonds.

Table 6

Rate of return of official Riga Stock Exchange indexes RICI and DJRSE and dynamics of rate of return of government bonds

Year	RICI	Annual return, %	DJRSE	Annual return, %	LVL bonds
1997	741.1	641%	347.7	40.0%	5.5%
1998	187.9	-74%	98.1	-71.2%	12.0%
1999	176.7	-5.9%	93.3	-4.9%	12.2%
2000	174.1	-1.5%	139.1	49.1%	9.1%
2001	162.5	-6.6%	200.4	44.0%	6.5%
2002	207.1	27.4%	161.0	-19.6	3.9%
2003	483.1	133.2%	228.3	41.7%	4.2%
2004 <sup>1</sup>	159.7	-22.5%	159.7	-22.5%	4.0%
2005	272.6	41.2%	272.6	41.2%	3.2%

In international practice, already established risk factors are used, which are calculated considering the credit rating assigned to the particular state. Financial institutions use different valuation criteria and forecasting methodologies. One of the options is establishment of internal and external economic risk indicators. This model requires qualitative processing and forecasting of economic information. The task of analysts is to appropriately evaluate the development of particular factors and their impact on the national economy.

Calculation of economic risk indicator will be described without an in-depth valuation and analysis of indicators. In order to establish the changes in the economic environment having strong impact on the investment climate in the particular country, and thus also on the value of securities quoted on the stock exchanges, financial institutions use several methods allowing evaluating economic situation and changes within it, one of the methods being establishment of external and internal economic indicator.

#### *2.4. Development and application of the Latvian economic environment risk assessment model*

##### Stage I

Evaluation of definite internal and external economic indicators. Evaluation of existing economic environment. Selection of factors or indicators used in calculations:

- ✓ internal economic risk indicator (IERI);
- ✓ external economic risk indicator (EERI);

##### Stage II

In this stage it is necessary to have experts' risk assessment. Each indicator is assigned a definite relative impact weight. Sum total of all factors is equal to 1. The weight of indicators is

<sup>1</sup> For 2004 and 2005 the values of Riga Stock Exchange indexes are substituted by the values of OMX Riga index.

not changed too often; these parameters are changed only in special cases (e.g., the Russian crisis), in a normal situation it is necessary to establish a schedule applied for revaluation of factor parameters and their weight in the index.

Table 7  
Parameters and structure of internal economic risk indicator (IERI)

	Internal economic factors	Value range	Weight	Value	Result
1.	GDP, last 12 months	1 - growth exceeding 10% 10- reduction exceeding 10%	0.05	7	0.35
2.	Forecasted GDP trend against the previous period	1 - significant growth 10- significant fall	0.1	4	0.4
3.	Growth of capital investments in 12 months	1 - growth exceeding 10% 10 - reduction exceeding 10%	0.1	7	0.7
4.	Anticipated growth of consumer demand	1 - growth exceeding 10% 10 - reduction exceeding 10%	0.05	1	0.05
5.	Inflation rate last 12 months	1 - below 5% 10- over 10%	0.05	1	0.05
6.	Inflation changes, forecast for 12 months	1 - sharp reduction 10 - significant increase	0.05	3	0.15
7.	Access to foreign financial resources	1 - easy 10- impossible	0.1	3	0.3
8.	Available workforce	1 - big labour workforce market 10 - big shortage of workforce	0.025	2	0.04
9.	Interest rate dynamics 12 months	1 - steep decline 10- rapid rise	0.1	4	0.4
10.	Fiscal policy	1 - stimulating 10- restricts economic activity	0.125	9	1.8
11.	Tax rate	1 - relatively low 10- relatively high	0.1	6	0.6
12.	Forecasts with regard to tax policy	1 - substantial reduction 10-substantial rise	0.05	6	0.3
13.	Changes in the energetics sector	1 - growth exceeding 10% 10 - reduction exceeding 10%	0.1	3	0.3
Total			1		4.78

### Stage III

Each indicator is assigned a value (from 1 to 10). The value is based on the fluctuations and the value of indicator. Best evaluation is 1 point, the worst 10 points. The weight established for each factor is multiplied by the value, and the sum total of the results obtained constitutes the value of risk index. The value of risk index ranges from 1 to 10.

### Stage IV

The IERI and EERI values obtained are compared with the previous period, a lower risk value testifies to the reduction of external and internal economic risk (the economic situation improves) and vice versa.

Valuation of these risk rates must be done regularly, once a month or even on a more frequent basis, depending on the changes in the internal and external economic environment. When establishing the dynamics of economic risk indicator and accumulating statistical information, it is possible to evaluate the interrelationship and correlation of different factors and other parameters graphically. Due to the limited scope of the research and owing to the data available to the author, the promotion thesis does not present a systematic and cyclic calculation of indexes.

Table 8 Parameters and structure of external economic risk index (EERI)

	External economic factors	Value range	Weight	Value	Result
1.	Total economic situation in the CIS	1 - good 10 - serious problems	0.05	4	0.2
2.	Economic situation in Western Europe, Central Europe, partner states	1 - good 10 - serious problems	0.05	3	0.15
3.	Forecasts for export to CIS countries 12 months	1 - increase exceeding 20% 10 - reduction by 20%	0.1	2	0.2
4.	Forecasts for export to Western Europe, Central Europe, partner states	1 - increase exceeding 20% 10 - reduction exceeding 20%	0.2	3	0.6
5.	Forecast of dynamics of external trade and current account deficit 12 months	1 - positive 10 - negative	0.2	3	0.6
6.	Growth of foreign direct investment 12 months	1 - increase exceeding 20% 10 - reduction exceeding 20%	0.15	3	0.3
7.	Restrictions of capital flow	1 - minimal restrictions 10 - essential restrictions	0.05	2	0.1
8.	Trade restrictions	1 - minimal restrictions 10 - essential restrictions	0.05	3	0.15
9.	Fluctuations of LVL currency rate	1 - minimal 10 - maximal	0.1	3	0.3
Total			1		2.6

### 3. *Formation of investment processes and selection of investment policy*

The process of investment is extensively described by many authors, the sequence of this complicated process being treated very similarly. The investment process incorporates five interrelated sequential steps:

- *selection of investment policy;*
- *analysis of securities market;*
- *formation of securities portfolio;*
- *revision of securities portfolio;*
- *assessment of effectiveness of securities portfolio.*

Formation of an investment portfolio is a sufficiently complicated and complex process. There is a great variety of portfolio formation tactics and theories. The author of this promotion thesis presents a more in-depth analysis only of those models of portfolio formation, which, according to the author's opinion, are best suited to the model of local securities market.

Formation of a portfolio usually includes the following steps:

- 1) identification and evaluation of investor's goals and interest and construction of a portfolio for a particular investor, taking into account the requirements posed.
- 2) establishment and implementation of a possible investment strategy, selection and optimal combination of securities available in the market;
- 3) supervision of the market situation, asset value and investor situation;
- 4) change of portfolio structure, depending on the market situation.

For describing an investment portfolio the author comes up with the following portfolio definition:

*Market portfolio is a securities portfolio, which consists of all securities, in which the share of each type of securities corresponds to its conditional market value. Conditional market value of a security corresponds to the total value of the securities market divided by the total value of securities in the market.*

#### 3.1. *Selection of securities for building up investment portfolios*

There are several strategies and conceptions of building up an investment portfolio. Chapter 1 of the promotion thesis has already dealt with the classification of types of investment portfolios. The most widely used investment portfolio types are: shares portfolios, balanced (shares + fixed return securities), fixed return portfolios, cash market portfolios (short-term fixed return securities and deposits).

Portfolios built up based on indexes are usually well differentiated. The APT model offers possibilities to build up good index-related portfolios. Risk exposure of such portfolios is usually maximally approximated to zero; however, it has to be remembered that the whole basic idea of the model is based on historical values.

It is more complicated to follow a standard or a portfolio, which is not diversified. Therefore it may not be asserted that risk exposure is always very close to zero. In such a case it is necessary not only to follow the risk exposure but also consider the accordance with the selected portfolio standard or index. One of the possible options is building up a portfolio from shares forming the standard, which are freely selected.



### *3.2. Selection of methods and parameters for assessment of return on investments*

There are many factors that affect asset risk. The main of them are market capitalisation, return and growth of dividends, P/E ratio, etc. But there are at least three very essential problems concerning these assessments:

- a) most of these parameters are based on accounting data, thus these indicators may be affected by the fact that companies use different accounting standards.
- b) only if companies use the same accounting standards and the same dates for notifying about the results, it would be possible to form a synchronised comparison of companies.
- c) It is important that to date there is no accurately formulated theory, which could tell how traditional systems can affect risk assessment, which in its turn affects return on investments. If historical relationship could be used, without using any basic valuation theories, this could result into a situation that the relationship between historical correlations could be forged and the object can suddenly change.

### *3.3. Modelling of an optimal investment portfolio*

Considering the recommendations of several sources of reference, there are many factors that have to be taken into account and have to be analysed for building up a successful investment portfolio. These factors are listed below:

*making investments in small-caps companies showing big growth potential;*  
*showing a good potential for increasing P/E, P/CF and P/BV;*  
*powerful and stable management;*  
*good possibilities to increase shareholders value;*  
*transparency in information offer;*  
*present or potential market leader's position;*  
*good return on equity;*  
*powerful research and development policy;*  
*production costs are lower than production costs of rival manufacturers;*  
*bigger sales of products;*  
*good profitability;*  
*good and stable balance sheet indicators;*  
*stable and sufficient cashflow;*  
*possibilities for mergers or acquisitions without new stock issues;*  
*valuation in connection with growth forecasts;*  
*automation;*  
*new products;*  
*growing demand for company's products;*  
*increase of sales;*  
*innovations;*  
*the firm is not well known;*  
*growth of the ratio of the number of 'shares/rate of return.*

### *3.4. Management of investment result and comparison and analysis of methods for assessing a possible investment risk level in Latvian conditions*

The main goal of the operation of an investment portfolio can be defined very simply: to invest funds in different assets and to do the utmost to maximise the value of these assets.

#### Equity market risk profile:

- 1) Capital risk implies general risk in the particular assets market, in which cash funds are invested (real estate, currency, securities, gold etc.). The risk that the investor could fail to convert assets into "real cash", to receive his money back without suffering losses.
- 2) Selective risk occurs if one of the investment objects out of other alternative options of one and the same type of assets is not selected appropriately.
- 3) Temporary risk is connected with bad timing of buying or selling assets, which inevitably results in losses.
- 4) The risk of changes in legislation may result in the changes in the rules on property management and reregistration of ownership rights for particular types of assets.
- 5) Liquidity risk is related with the possibility to incur losses when selling assets due to the changes in evaluation of properties of these assets.
- 6) Credit risk implies that the firm, which has taken money from investor is unable to pay interest on/or return the principal debt amount.
- 7) Inflation risk implies that under high inflation the income earned by the investor loses its value.
- 8) Country risk is a risk to invest in assets offered by a country with an unstable social and economic situation, or hostile attitude to the country the investor comes from.
- 9) Business risk is the risk related with the specifics of a particular industry. In terms of this risk, it is necessary to take into account the specifics inherent to each particular branch of economy.
- 10) Enterprise risk is a risk caused by the activity of the particular enterprise in the market. Even in a favourable situation in the market, stable and dynamic development of the industry and economy on the whole, there will always be companies whose situation will be different and in some cases even absolutely opposite to the general situation in the industry.
- 11) Currency risk is a risk related with investments in currencies due to foreign currency risk fluctuations. For mitigating currency risk it is recommended to diversify currencies.

#### *4. Comparison and evaluation of applicability of business valuation methods in Latvian conditions*

The basic concept of fundamental analysis is that "real" value of a company is established, based on several financial indicators and forecasts (e.g., growth of sales, risk profile, cash flow, etc.).

Any deviation from this value of an enterprise indicates that the company is overvalued or undervalued, which, in its turn, gives a possibility for using this as initial bid.

Main assumptions of long-term investment strategies are:

- I) There is a relation between the value and basic financial indicators of the company;
- II) This relation is stable over a longer time period;
- III) Deviations from these relations are adjusted for a particular time period.

### *Expert (franchise buyer's) approach*

This investment approach is classified as a long-term strategy and here main assumptions are:

- I) The investor is an expert who knows the particular business sector, environment, possibilities and is in a much better position than others, since he is able to objectively assess the particular company and its development potential;
- II) An undervalued company can be bought at a substantial discount below the "real" price of the said company.

### *Significance of valuation for acquisitions*

Evaluation is absolutely essential in the acquisition-sales process. A firm that buys another company has to establish the "real" value of the other company in order to come up with its initial bid for acquisition. *Importance of valuation in corporate finance*  
By assuming that the goal of corporate financial activity is maximisation of the value of the company, there is a very tight relationship between corporate strategy, financial plans, and value of the company.

The value of a company is rather directly influenced by the decisions taken by the company, incl. plans of future projects, how to finance them, what is the policy with regard to dividends, the attitude towards investors, etc.

In such a way, by understanding the relationships between corporate management decisions and the value of the company, it is possible to achieve a maximum value.

#### *4.1. Assessment and selection of criteria for selecting business valuation methods*

There is no universal business valuation method that can be applied to all companies, since there are different performance indicators and growth prospects. Industries demonstrate different growth rates and cycles. When establishing the value of a company, it is necessary to consider both the trends and development cycles in the domestic and foreign securities markets. The planned growth of performance indicators of a company is one of the most relevant factors impacting the value of the business. Therefore there are different ways of establishment of the planned growth used in calculations. The most accurate are multistage methods of calculation which allow using different growth rates of a company in its different development or operation stages.

The bigger the number of companies analysed, the higher the precision of the value established for the particular company. In order to apply this selection criterion to local firms, it is necessary to perform an analysis of financial indicators of firms.

#### ***Criteria of selection of the optimum model for evaluation of company's shares.***

- ✓ The growth model should be applied if the company has a positive cash flow.
- ✓ The stable growth model should be applied if the growth rates of a company are comparable with economic growth rate (allowed deviation 1 - 2%).
- ✓ The 2-stage growth model should be applied if a company's growth rates exceed economic growth rates within the range of 8%.
- ✓ The 3-stage model should be applied if the company's growth rates exceed economic growth rates by more than 8%.

Table 9

## Criteria of selection of the most suitable cash flow discount model

Models	Dividend discounting model	Free cash flow FCFE discounting model	Free cash flow FCFF discounting model
<b>Stable growth model</b>	<ul style="list-style-type: none"> <li>The growth of the company is stable +1% against economic growth</li> </ul>	The growth of the company is stable + 1% against economic growth	The growth of the company is stable + 1% against economic growth
	<ul style="list-style-type: none"> <li>The amount of dividends is close to cash flow amount</li> </ul>	<ul style="list-style-type: none"> <li>The amount of dividends is different from the cash flow amount FCFE, or dividends are not paid</li> </ul>	
	<ul style="list-style-type: none"> <li>Stable ratio of liabilities against owners equity</li> </ul>	<ul style="list-style-type: none"> <li>Stable ratio of liabilities against owners equity</li> </ul>	<ul style="list-style-type: none"> <li>Fluctuating ratio of liabilities against owners equity</li> </ul>
<b>2-stage model</b>	<ul style="list-style-type: none"> <li>The growth of the company is changeable</li> </ul>	<ul style="list-style-type: none"> <li>The growth of the company is changeable</li> </ul>	<ul style="list-style-type: none"> <li>The growth of the company is changeable</li> </ul>
	<ul style="list-style-type: none"> <li>The amount of dividends is close to FCFE or FCFF level</li> </ul>	<ul style="list-style-type: none"> <li>The amount of dividends considerably differs from FCFE or FCFF level or dividends are not paid</li> </ul>	
	<ul style="list-style-type: none"> <li>Stable ratio of liabilities against owners equity</li> </ul>	<ul style="list-style-type: none"> <li>Stable ratio of liabilities against owners equity</li> </ul>	<ul style="list-style-type: none"> <li>High and changeable ratio of liabilities against owners equity</li> </ul>
<b>3-stage model</b>	<ul style="list-style-type: none"> <li>High growth and return rates</li> </ul>	<ul style="list-style-type: none"> <li>High growth and return rates</li> </ul>	<ul style="list-style-type: none"> <li>High growth and return rates</li> </ul>
	<ul style="list-style-type: none"> <li>The amount of dividends is close to FCFE or FCFF level</li> </ul>	<ul style="list-style-type: none"> <li>The amount of dividends considerably differs from FCFE level or dividends are not paid</li> </ul>	
	<ul style="list-style-type: none"> <li>Stable ratio of liabilities against owners equity</li> </ul>	<ul style="list-style-type: none"> <li>Stable ratio of liabilities against owners equity</li> </ul>	<ul style="list-style-type: none"> <li>High and changeable ratio of liabilities against owners equity</li> </ul>

One of the main parameters, which impact the level of valuation, is capital cost, which can be compared to the average credit rate in the country. In local conditions, companies rarely draw on

raising capital by means of equity and corporate fixed income securities, therefore it is reasonable to assume that capital cost rate is equal to average long-term credit rate in the particular country.

Table 10  
Parameters characterising growth rates of a company

Parameters	Dividends discounting model	FCFE discounting model	FCFF discounting model
<b>Companies with a high growth rate</b>	• Low dividends, dividends are not paid	• High capital costs ratio against depreciation	• High capital costs ratio against depreciation
	• High ROA	• High rate of return	• High rate of return
	• Low liabilities/owners equity ratio	• Low liabilities/owners equity ratio	• Low liabilities/owners equity ratio
	• High risk level (high $\beta$ )	• High risk level (high $\beta$ )	• High risk level (high $\beta$ )
<b>Companies with a stable growth rate</b>	• High dividend yield (high dividend pay-out ratio)	• Small difference between capital costs and depreciation (sometimes these indicators compensate each other)	• Small difference between capital costs and depreciation (sometimes these indicators compensate each other)
	• Average rate of return (ROA is comparable with industry level)	• Average rate of return (ROA is comparable with industry level)	• Average rate of return (ROA is comparable with industry level)
	• High liabilities/owners equity ratio	• High liabilities/owners equity ratio	<b>High liabilities/owners equity ratio</b>
	• Average risk level ( $\beta$ is close to 1)	Average risk level ( $\beta$ is close to 1)	Average risk level ( $\beta$ is close to 1)

Accurate application of the valuation method listed above is closely related with the establishment of the rate of return of a particular company.

The main reasons, which impact short time and unexpected fluctuations of the rate of return of a company, can be the following:

- The company can have an unexpectedly good or bad financial year (this is usually something that cannot be forecasted and predicted).
- The company has financial problems, the existing rate of return is low or even negative;
- Usually company's performance indicators are positive and existing problems are temporary and incidental.
- The company can be a new start-up launching its operation in the industry that has already developed and the other companies operating in this industry demonstrate a constant rate of return.

The rate of return used in calculations must be established based on the following principles:

- If the company faces difficulties due to reduction of production volumes, resulting from reduction of production volumes in the industry, but the company's capital has not reduced over the whole time period, in calculations it is recommended to use the average rate of return for the whole time period under consideration (in foreign countries it is a period from 5 to 10 years, but in Latvian conditions the information about performance of companies in most cases is available for the previous 3 years of operation).
- It can be assumed that standard rate of return is average rate of return for the previous years of operation.
- If performance indicators of a company have deteriorated due to recession and the return on equity has changed, in such a case it is possible to use average ROE for the previous years of operation.
- For establishing the standard rate of return it is also possible to use the average ROE of the particular industry.
- Reduction of rate of return of a company is related with specific factors of its operation, but other companies of this industry operate and demonstrate good rate of return, it is recommended to use average ROE demonstrated by the companies operating in the particular industry.

The criteria selected and grouped in Tables 9 and 10 are recommended by the author of this promotion thesis for determining the model to be applied for valuation of companies. In order to establish the value of the companies quoted on the Riga Stock Exchange and calculate the parameters of local equity market, it is recommended to use the FCFE method, since only 20% of the companies quoted on the Riga Stock Exchange regularly pay out dividends, in most cases corporate profit is reinvested.

#### *4.2. Sequence of valuation of companies by applying the cashflow assessment method*

On the whole, valuation of companies consists of five stages:

1. Historical performance analysis:

- ✓ Calculation of net profit of business performance and invested capital;
- ✓ Calculation of value drivers;
- ✓ Financial health analysis.

2. Operation forecast:

- ✓ Understanding of strategic position;
- ✓ Building up of operation scenarios;
- ✓ Forecasting of individual items;
- ✓ Assessment of credibility of the whole forecast.

3. Forecast of equity price

4. Establishment of company's liquidation value.

5. Calculation of results and interpretation.

Table 11

Dynamics of financial performance indicators of companies quoted on the Riga Stock Exchange, % per annum

Indicators	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Growth of sales per annum	132.55	19.92	-0.30	-6.14	6.16	6.60	0.82	12.28	12.60	20.00
Growth of net profit	165.26	376.47	-166.41	-67.42	18.10	-75.25	40.57	143.10	415.40	-77.20
Annual growth of return per share	253.70	593.18	-29.98	-69.92	14.95	-56.77	-76.23	13.04	0.68	56.53
GDP growth	2.8	8.6	3.9	1.1	6.6	8.0	6.4	7.5	8.6	10.2

The data presented in Table 11 show average performance indicators, which were obtained by summarising the performance indicators of 8 most liquid industrial enterprises, therefore the results obtained may not be regarded as reflecting the situation in some particular sector of industry in Latvia.

#### *5. Evaluation of Latvian economic situation and equity market*

According to the author, there are indications of a possible crisis in the Latvian national economy. The high inflation rate and the rapid rise in per unit labour costs reduce global competitiveness of Latvian companies. If the price and wage ratio against productivity in Latvia grows more rapidly than in major trade partner countries, this will lead to a more rapid increase of per unit labour costs. The rise in labour costs also leads to the increase of production costs of manufacturers.

With the reduction of export volumes and economic growth and retaining both internal and external disproportions (high inflation, high current account deficit), confidence in further development of the Latvian economy by foreign investors may decline: they will not be ready to invest in Latvia so much anymore, or the interest rates will substantially increase, which will make the financing by foreign investors very expensive. If today we are able to refinance a substantial share of the debt burden, then, with the reduction of these possibilities, external debt will have to be financed from own income in foreign currency, or taking loans abroad at considerably higher credit rates. International experience shows that when national economy faces a crisis situation, economic growth can essentially slow down or even stop for a several years time.

##### *5.1. Evaluation of the impact of economic factors on the Latvian equity market*

Factors that will impact the development of the Latvian equity market are:

- quality of issuers of securities;*
- stability of economic environment;*
- legislation and investor protection;*
- course of privatisation process.*





As can be seen from Table 12, average annual growth rates of return and profit indicators considerably differ from the growth of the GDP. Currently, the statistical information is still insufficient to accurately establish the regularities of development of individual industries.

Table 13  
Key indicators characterising shares quoted on the Riga Stock Exchange

Indicators by year	EPS	P/E	BV	P/BV	Div	DY	E/P	Dividend payout frequency
1998								
Avg.	0.07	5.66	1.45	0.41	0.02	5.30%	0.11	29%
Standard deviation	0.25	2.15	0.35	0.35	0.04	1.94%	0.41	
1999								
Avg.	0.06	7.99	1.25	0.58	0.06	4.18%	0.16	12%
Standard deviation	0.07	9.29	0.38	0.70	0.08	3.51%	0.15	
2000								
Avg.	0.07	6.17	1.21	0.45	0.08	7.05%	0.18	18%
Standard deviation	0.07	3.15	0.40	0.50	0.08	3.97%	0.20	
2001								
Avg.	0.08	8.96	1.18	0.57	0.04	3.67%	0.26	29%
Standard deviation	0.07	9.60	0.55	0.99	0.05	2.10%	0.19	
2002								
Avg.	0.08	2.84	1.18	0.47	0.02	2.10%	0.05	29%
Standard deviation	0.13	37.39	0.75	0.66	0.05	2.85%	0.60	
2003								
Avg.	0.07	11.98	1.46	0.54	0.03	2.49%	0.07	24%
Standard deviation	0.12	17.03	0.60	0.29	0.07	5.35%	0.12	
2004								
Avg.	0.07	11.98	1.46	0.54	0.03	2.49%	0.07	24%
Standard deviation	0.12	17.03	0.60	0.29	0.07	5.35%	0.12	

When comparing performance indicators of the shares of companies quoted on the Riga Stock Exchange with performance indicators of foreign companies, which are summarised in Table 13, it has to be concluded that the indicators of companies quoted on the RSE substantially lag behind the indicators demonstrated by foreign companies. Foreign companies have a considerable higher dividend payout rate. The amount of dividends paid out is one of the decisive factors impacting the calculation of the value of the company and forming the future cash flow, which investors expect from their investments in the particular company. The companies quoted on the RSE have a considerably lower balance liabilities ratio.

### *5.2. Analysis of the development trend of the Latvian equity market*

The analysis of macroeconomic indicators must be made in order to gain understanding about the economic situation and possible further developments, which is very important for taking investment decisions. In the ideal situation we would like to predict the future, but we are restricted in analysing the current situation, obtaining results and making extrapolation. Microeconomics has to be considered from four angles:

*macroeconomic theory and regularities;*

*mathematics of macroeconomics;*  
*cyclic development of economy;*  
*macroeconomic development forecasts.*

In order to evaluate the companies quoted on the RSE, the author of this promotion thesis has established performance indicators of East European companies and indicators characterising the value of an enterprise. It has to be concluded that companies quoted on the RSE often lag behind the profitability indicators. Market capitalisation and the size of share capital also do not stand comparison. These could be principal reasons why investors' interest about the companies quoted on the RSE is so low.

To day Asian and Scandinavian markets demonstrate the lowest P/E ratio, considering average indicators over the period of 10 years. The average P/E ratio for 10 years demonstrated by developed markets is 5 (the lowest in Japan - 9, the highest in Switzerland - 20). As for P/BV, this indicator ranges from 1.3 to 2.2 (Hong Kong, Singapore, Japan, Australia).

## *6. Equity market valuation model and valuation of shares of companies quoted on the Riga Stock Exchange*

The model developed allows evaluating the factors impacting equity market, their impact on the share market and value of shares. By applying this model it is possible to define the required rate of return of equity market and establish optimal price or value per share corresponding to the risk level, as well as to forecast the development trend of the market.

### *6.1. Development of an optimal securities market regression model by applying multivariate regression analysis*

The linear regression model for valuation of the securities market will be developed by applying the multivariate regression analysis. The main goal of development of this model is to establish economic factors having major impact on the development and development trends of the securities market. Economic processes are characterised and affected by a multitude of factors, which are impacting and interrelating with each other. Thus it is necessary to analyse each indicator individually. The securities market analysis will include valuation of each individual factor and its impact on the parameters characterising the securities market curve  $R_f$  (risk-free rate) and ERP (rate of equity market risk).

### *6.2. Modelling and establishment of the risk-free rate regression model*

The promotion thesis presents the first stage of the development of the equity market valuation model, i.e. valuation of the macroeconomic level, which includes factors affecting the free-risk rate. In the table below the author summarises economic factors, which according to the author, have major impact on the dynamics of fluctuations of the value of risk-free rate.

Table 14  
Factors  $f_{bi}$  ( $i = 1, 2, \dots, 7$ ) used in calculating the risk-free rate

Symbol	Factors
$f_{b1}$	GDP - gross domestic product
$f_{b2}$	CPI - inflation
$f_{b3}$	BD - budget deficit
$f_{b4}$	ExP - export growth
$f_{b5}$	gR - industrial growth
$f_{b6}$	B - unemployment
$f_{b7}$	RgGDP/POP -per capita GDP growth rate

When carrying out the analysis of the value of Latvian risk-free rate  $R_f$ , the author has used empiric values, which were used for developing the securities market model. When developing the securities market model, the author has used statistical values of macroeconomic factors. For establishing their impact on the value of risk-free rate  $R_f$ , the author has developed the risk-free rate  $R_f$  multivariate regression model. Initially, calculations of the model included all factors listed in Table 14.

In each stage different factors impacting the market rate fluctuations mentioned above were selected. In order to establish the impact of these factors on the total value and dynamics of fluctuations of the Latvian securities market rate, the mathematical risk-free rate model was developed by applying regression analysis.

In order to establish the impact of the selected factors on the securities market model to be developed, the author will use regression analysis. The development of the multivariate linear regression securities market model was split into three stages:

- 1) Development of the risk-free rate model;
- 2) Development of the securities market rate model;
- 3) Development of the enterprise rate model.

### Summary of the results obtained

- Out of 7 initially selected factors impacting the level of risk-free rate in Latvia, the author, by using regression curves, has selected 5 factors:  $f_{b1}$  GDP (GDP growth),  $f_{b2}$  CPI (inflation),  $f_{b3}$  BD (budget deficit),  $f_{b4}$ RP (industrial growth),  $f_{b5}$  RgGDP/POP (investments accumulated per capita)
- As a result of regression analysis it was established that such factors as  $f_{b6}$  ExP (export growth) and  $f_{b7}$  B (unemployment rate in Latvia) have smaller impact on the risk-free rate fluctuations.
- The risk-free rate model obtained is statistically significant having probability 0.996.
- Fisher criteria values  $F_{emp} = 54.5$ ,  $F_{crit} = 9.01$ .
- Values or risk-free rate model errors calculated

MSE	0.065
MAD	0.221
MAPE	3.62%

- Linear regression model  $R_f$  5 mod can be describes as follows:

$$R_f \text{ 5F mod} = 0.0356 + 2.2132 * f_{b1} + (-0.9874) * f_{b2} + (-3.0489) * f_{b3} + (-1.2584) * f_{b4} + 0.2856 * f_{b5}$$

Table 16

Factors  $f_f$  ( $i = 1, 2, \dots, 10$ ) used in the analysis of the rate of return of a company

Symbol	Factor
$f_{u1}$	ROE - return on equity
$f_{u2}$	ROA - return on assets
$f_{u3}$	Div - dividend calculated per share
$f_{u4}$	PO - dividend payout ratio
$f_{u5}$	gROE- growth of return on owners' equity
$f_{u6}$	gROA - growth of return on assets
$f_{u7}$	gEPS - growth of equity per share
$f_{u8}$	gDiv - growth of dividends calculated
$f_{u9}$	gPO - growth of dividend payout ratio
$f_{u10}$	S/PK - liabilities/equity ratio

In order to calculate the regression curve of the model, all factors listed were split into three groups, since the number of periods to be considered is smaller than the number of factors to be analysed. As the number of factors to be considered is bigger than the number of the periods, for the purpose of regression analysis the factors to be analysed were subdivided into separate groups. In each calculation period the author selected factors, which demonstrated the highest value of  $1-p$ .

#### Summary of the results obtained

- As a result of regression analysis, the company rate regression model was obtained -  $FI\ 3_{mod}$  comprises 3 factor: ROA - return on assets, gEPS - growth of equity per share, and PO - dividend payout ratio
- As a result of the analysis, such factors as  $f_{f1}$  ROE - return on equity,  $f_{f3}$  gEPS -growth of equity per share,  $f_{f4}$  Div - dividend calculated per share,  $f_{f6}$  gROE - growth of return on owners' equity,  $f_{f7}$  gROA - growth of return on assets,  $f_{f8}$  gDiv - growth of dividends calculated,  $f_{f10}$  gPO - growth of dividend payout ratio, and  $f_{f11}$  S/Pk -liabilities/equity ratio are recognised as less significant factors.
- By summarising the company rate linear regression model parameters, the author concludes that it is not useful to apply this model in practice, since the value of standard error of the model obtained is 39.25%, which indicates that the model is statistically insignificant.

#### 6.5. Summary of the results of regression analysis of the multivariate regression equity market valuation model

For establishing the rate of securities market return and compare the results obtained with statistical data, the author has used the so-called "out of sample forecast" method. By applying this method, the rate of return of the securities market for 2006 was calculated. Calculations were made, by using statistical data for the period from 1997 to 2005, which in its turn was compared with the securities market return rates calculated, using the values of statistical data for the period from 1998 to 2006.

The calculations obtained are summarised in Table 16. The value of return of the securities market obtained using output data for the period from 1997 to 2005 is 10.87% per year, in its turn, average return of the securities market for the period from 1998 to 2006 is 7.22%. In order to calculate the rate of return of the securities market, the author of the

promotion thesis has established the weight of each method, using the obtained MAPE error values.

Having analysed the results obtained, the author can conclude that the obtained securities market rate value VPT, by using the statistical data for the period from 1997 to 2005, is 16.9%. At the same time, the VPT rate value obtained using statistical data for the period from 1998 to 2006 is 11.7%, which is considerably closer to the average return value of the statistical index of the Riga Stock Exchange, which in the period from 1997 to the end of 2005 was 10.87%.

After the analysis of the data obtained, the author concludes that for calculating the rate of return of the Latvian securities market in a long term it is more useful to use statistical data accumulated for a longer time period.

In order to more accurately establish the securities market rate of return, the author of the promotion thesis has established the weight of each method, and thus the securities market rate of return is calculated according to the following formula:

$$R_{VPT} = \sum_{i=1}^n \omega_i \cdot R_{VPTMi} , \quad (15)$$

where  $R_{VPT}$  - established securities market rate of return;

$\omega_i$  - weight of the method used in calculations;

$R_{VPTi}$  - value of the securities market return, by applying the  $i^{th}$  method.

Table 17  
Calculated values of securities market rate of return

Methods	1998- 2006	1997- 2005	MAPE	Weight	2006 forecast data	MAPE	Weight
Method 1	10.6%	17.9%	40.8%	11.7%	-23.5%	145.1%	11.0%
Method 2	19.2%	16.4%	16.6%	4.7%	-21.2%	190.6%	14.4%
Method 3	16.2%	13.4%	20.9%	6.0%	27.9%	41.8%	3.2%
Method 4	57.7%	51.2%	12.7%	3.6%	18.1%	218.1%	16.5%
Method 5	71.7%	75.3%	4.8%	1.4%	42.0%	70.8%	5.4%
Method 16	26.0%	26.0%	0.1%	0.0%	28.3%	8.1%	0.6%
Method 3F	22.7%	21.1%	7.2%	2.1%	16.3%	38.7%	2.9%
Method 3F (ERP)	10.5%	17.9%	41.2%	11.8%	-23.7%	144.5%	10.9%
Method 6F	15.5%	15.5%	0.2%	0.1%	17.4%	10.9%	0.8%
Method 6F (ERP)	10.5%	17.9%	41.2%	11.8%	-23.7%	144.5%	10.9%
Method 4F	1.7%	4.3%	60.8%	17.4%	12.1%	86.0%	6.5%
Method 4F (ERP)	13.4%	20.8%	35.5%	10.1%	-23.0%	158.4%	12.0%
Method 4F"	4.8%	14.9%	67.9%	19.4%	13.2%	63.7%	4.8%
Sum total			349.9%	100.0%		1321.0%	100.0%
Calculated return	1.1.75%	16.98%			-5.22%		

## Summary of results obtained

- Using the developed five-factor regression model  $R_f$  5 mod, the Latvia risk free-rate for 2006 was forecasted. The value of the rate obtained is 3.95% per year (Annex 13).
- Using the developed three-factor securities market rate regression model  $V_p$  3 mod, the growth rate of the share market was calculated for 2006. The obtained share market growth rate is negative - 10.87% (Annex 15).
- The author of the promotion thesis has established the equity market rate of return; the value of the rate obtained is 11.75%. The rate can be used for calculating the value of a company or shares.
- The developed multivariate regression models can be used for forecasting risk-free rates and fluctuations of share market rate of return for the period of 2 years.
- For long-term investments in the shares of Latvian companies and share market it is necessary to use the calculated equity market rate of return

### *6.6. Application of the developed securities market valuation model for valuation of the securities market and individual companies*

Returning to the method of equity market valuation and valuation model, the author suggests the following sequence in the valuation of equity market:

#### Stage 1

According to the author, the first step is the analysis of Latvia's macroeconomic indicators and factors, by comparing them against indicators of other countries. Comparison has to be based on statistical data.

Analysis of macroeconomic indicators will allow valuation of risk-free rate for investments in Latvia, as well as evaluate Latvia's appeal as an investment object in the eyes of investors.

Statistical data are summarised and analysed, data, examination and updating of data must be done at least once a month; if fluctuations exceed average indicators, analysis has to be carried out on a more regular basis.

Stage 2 In this stage the author suggests to establish the share market risk rate; the sequence of establishment of the rate of risk of the share market is described in Chapter 2.2 of the promotion thesis and the results obtained are summarised in Table 2.3 of the promotion thesis. So that the results obtained would be more objective, the author suggests to establish the rate of risk of the share market as an average value from all methods used.

Stage 3 In this stage basic indicators of the Riga Stock Exchange are analysed, average values of key parameters are calculated, value is established for the following indicators:

- ✓ market capitalisation;
- ✓ market turnover;
- ✓ P/E;
- ✓ DY;
- ✓ P/BV.

#### Stage 4

In this stage it is necessary to analyse the companies quoted on the Riga Stock Exchange. The result of the analysis is a summary of financial indicators quoted on the RSE and analysis of these indicators. In this stage it is established which method is the most suitable valuation method for the company. In this stage, the author suggests to apply one valuation method to

all companies quoted on the Riga Stock Exchange. These valuation methods are dealt with in Chapter 4.1. The author has elaborated common principles based on which it is possible to establish the most suitable method of valuation (Table 9 and 10).

#### Stage 5

In this stage indicators characterising the operation of the Riga Stock Exchange and equity market are compared with foreign indicators. The investors appeal of the Latvian equity market and its competitiveness in attracting investments is assessed. This stage is essential, since in this stage the general situation is evaluated, and appeal of the Latvian equity market is established.

After implementation of all the stages of the model described above, the author offers the calculation for establishing the value of a company. Using the methods of valuation of companies and equity market dealt with in the previous chapters, as well as parameters characterising the equity market obtained by the calculations, the author has calculated the prices of shares of Latvian companies quoted on the Riga Stock Exchange. The results obtained are summarised in Table 18. The calculations were made using the CFFE stable growth model.

As can be seen from the results obtained, part of the shares quoted on the RSE are overstated, their market price is higher than the value calculated; at the same time some prices of shares are lower than their market price. The results obtained can differ from the market price, since investors evaluate companies and their value differently, which leads to different results.

Table 18

Calculation of prices of shares of companies using calculation models selected and developed by the author of the promotion thesis

Company	Growth rate established by the FCFE growth model, %			
	3%	4%	5%	6%
GAZE	3.09	3.55	4.15	6.20
VNFT	2.00	2.69	3.22	4.01
RKBV	1.87	2.15	2.51	3.75
LMET	2.64	3.03	3.54	5.29
VSSK	1.07	1.23	1.44	2.15
OLFA	0.77	0.88	1.03	1.54
GRDX	1.37	1.57	1.84	2.75
DPKR	2.68	3.08	3.60	5.38

#### **Possibilities of improvement of equity market valuation model**

The model can be practically applied. At the same time, the model can also be improved carrying out an in-depth analysis of economic factors. In the contemporary changing environment it has to be taken into account that economic interrelationship of factors may differ from the pattern they behaved in the previous years, since economies of different countries are involved in increasingly closer interrelationships due to globalisation processes, when a company can efficiently operate not only within the borders of one state but also within the European framework or expand its operation even further in the world.

As a result, both entrepreneurs and managers of companies encounter new regularities; new factors come to the fore, which impact market development trends and growth prospects. Similarly, as in the example with the Riga Stock exchange, it can be observed that, with the entrance of foreign investors, the operation of the RSE is also undergoing qualitative changes, the requirements to issuers change, share price fluctuations gradually adapt to the levels of EU, US and emerging markets. We are increasingly feeling ourselves as part of global economy and are forced to accept, understand and observe these operation principles and

regularities. The advantage of Latvia is that it is a small and sufficiently flexible economy, which has been able to relatively rapidly overcome crises and reorient itself to new markets and industries, which is a good precondition for further and sustainable growth of the state in the future.

### **Conclusions and recommendations:**

1. Analysis of equity market is a complicated process. Qualitative equity market analysis and building up of securities portfolio requires good knowledge of basic economic principles, as well as analysis of the financial situation of companies.
2. Equity markets in different regions of the world are interrelated, crises in one region of the world trigger crises in other countries. Emerging markets are start to occupy an increasingly stronger position in the global equity market, since in the recent years the Western equity market is considered as overheated.
3. Since the second half of 1997, the local Latvian and also Baltic equity market experience a drop, the low activity in the Baltic stock exchanges being mostly caused by the following factors: 1) comparatively low capitalisation, thus a high liquidity risk; 2) local companies fail to ensure favourable financial performance policy and growth of rates of return to increase investors interest.
4. A new trend in Latvia is the development of private pension funds and investment funds, as a result of which it is possible to forecast new long-term monetary resources in the local equity market. In parallel, we can also observe the development of risk capital funds, which are aimed at developing SMEs.
5. Foreign institutional investors are still insufficiently represented in the Latvian equity market; at the same time domestic investors have not accumulated sufficient cash funds to activate the market.
6. Latvia's entry in the EU and NATO, as well as successful development of economy (Growth of GDP, low inflation rate, high S&P rating, etc) could increase the interest of foreign investors in the years to come.
7. One of the problems that characterises local equity market is the low information accessibility level about companies, there is a lack of public information about companies' development plans and existing financial situation.
8. The share of Riga Stock Exchange in attracting foreign investment is comparatively low, companies do not use the RSE as a means for attracting new investments.
9. Companies quoted on the RSE do not provide sufficient rate of return per share, which would correspond to the risk level. Dividend yield from these shares is not bigger than from fixed return securities, thus it can be concluded that in the current situation it is more profitable to build up securities portfolios comprising fixed return securities.
10. The comparatively small number of quoted securities does not allow the RSE to sufficiently diversify the security portfolio; in addition, the low market liquidity does not allow building up a sufficiently voluminous portfolios, which would ensure investors return and coverage of portfolio management costs.
11. The return ensured by the companies quoted on the RSE are lower than the risk-free rate in this market. This could be one of the main reasons which could hamper the growth of activity in the Riga Stock Exchange.
12. Valuation of companies can be carried out by applying the following methods: Future income methods; Relative valuation methods; and Asset valuation methods. Each of these methods is subdivided into sub-methods or models, which can be used in valuation of public companies as well as companies whose shares are not publicly traded.
13. Company's valuation theory focuses on the assumption that corporate value has to be built up from future cash flow discounted back at an appropriate discount rate.



14. Discount rate, which is applied to the future cash flow, is to include risks related with the particular company, market, state, as well as include the desirable investors return on the capital invested.
15. When valuating companies, there may be difficulties to form a real future cash flow forecast and establish a suitable discount rate, therefore it is possible to use methods, which are based on the historical and present day financial and market indicators of the company. The most essential initial variables in this case are earnings and profit of the company, the forecasted development growth rate, company's present and future asset value, the size of dividends paid out by the company presently and in the future.
16. The aforementioned activities of the company only reflect the fact that the value of the company for its owners consists of successful or unsuccessful operation of the company, value of assets and successful or unsuccessful sale of the company or its part.
17. Valuation of the company implies different values; often the value seen by the holder of controlling stake of the company does not coincide with the value seen by the company's minority shareholders.
18. Most of the valuation methods described in this promotion thesis can be applied in Latvian companies and thus they allow to establish and be informed about the value of Latvian enterprises.
19. Valuation of companies and establishment of the most objective value is important both when taking decisions or making investments, as well as taking decisions on sale of investments.
20. Establishment and use of a wrong value of an enterprise can cause inadequate decision-taking, which could result in reduction or loss of money invested.
21. When estimating the size of dividends paid out by the companies quoted on the RSE, it has to be taken into account that dividends were paid out only by 23.5% of the companies quoted on the RSE.
22. The dynamics of EPS of the shares quoted on the RSE was established for 2002, taking into account the annual EPS growth rate. The correlation coefficient of the RICI stock exchange index and the dynamics of industrial growth is 0.35; at the same time the correlation coefficient of changes of RICI stock exchange index and EPS ratio is 0.71.
23. Profitability indicators of the companies quoted on the RSE demonstrate fluctuations over a big range; standard deviation of total rate of profit is 36%.
24. Average annual growth of PO is 9.3%; at the same time standard deviation is 6.3%. The highest PO level was in 1997, when it reached 18.9%; in the following years PO has gradually reduced reaching 6.0% in 2001.
25. The analysis of several equity market valuation methods published in scientific literature allows the author to conclude that existing methods fail to provide complete information about the application of existing methods in Latvian conditions. The existing models do not consider the specifics of the Latvian market.

## **Recommendations**

1. For PO coefficient to more accurately correspond to the market situation, the author suggests to establish PO coefficient, considering the frequency of dividend payouts; average dividend payout frequency coefficient (PO) for the shares quoted on the RSE is 12.61%.
2. The criteria for selecting the most appropriate valuation model of company's shares are:
  - The growth model is applicable, if the company has a positive cash flow.
  - The stable growth model is used, if the growth rate of the company is comparable to the growth rate of economy (acceptable deviation 1 to 2%).
  - The dividends growth model can be used, if company's growth rates exceed economic growth rates within the range of 8%.

- The three-stage model is used, if company's growth rates exceed the economic growth rates by more than 8%.
3. It is recommended to calculate the value of equity market rate of return as average of all methods dealt with in Chapter 2.2 of the promotion thesis, taking into account the significance of each method. The calculated Latvian equity market return is 11.7%.
  4. The multivariate linear regression analysis of the securities market allowed to select 3 decisive factors affecting share fluctuations on the RSE: Fvp 3Div - dividend yield, Fvp 8RDiv - growth of dividend yield ratio, Fvp 11IKP - growth of GDP.
  5. The multivariate regression analysis of risk-free rate allowed to select most relevant factors: GDP - fb1 IKP, inflation rate - fb2 CPI, budget deficit - fb3 BD, industrial growth - fb5 RP and per capita GDP growth - fb7 RgGDP/POP.
  6. For calculating the rate of return on equity market for investments for the time period up to 2 years it is recommended to use the values of economic factors used in calculations of the current year.
  7. For valuation of optimal rate of return on long-term investments, in the Latvian equity market it is possible to use average values of economic factors for the previous time period.
  8. When valuating companies, it is recommended to base on the cash flow method and to discount its value with a suitable discount rate in order to establish current value of the future cash flow. After establishment of the value of the company, it is necessary to compare it with the value of another, similar company.
  9. To develop several possible development scenarios, in order to forecast the possible development of the company and industry, as well as critical factors which can affect the performance of the company.
  10. To use the relative valuation method as an additional valuation method to obtain a more qualitative reflection of the value of the company.
  11. In calculations the rate of return has to be established based on the following principles:
    - If the company faces problems due to reduction of production volumes, which is related with reduction of production volumes in the respective industry, but company's equity in the whole time period has not reduced, for the calculation purposes it is recommended to use average rate of return for the whole time period under consideration (in foreign countries it is 5 to 10 years). In Latvian conditions the information about the performance of a company in most cases is available for the previous 3 years. Thus the author recommends developing the cash flow also for the period, which does not exceed the period from 3 to 4 years.
    - If performance indicators of the company have deteriorated due to recession, and equity level of the company has changed, it is recommended to use average ROE for the previous years of operation.
    - For establishing the standardised rate of return it is recommended to use also average ROE for the industry.
    - Reduction of rate of return of a company due to specific operation factors of the said company, but companies of this industry operate and demonstrate good profitability indicators. In calculations it is recommended to use average rate of return on equity demonstrated by the companies operating in the particular industry.