Theory of Elton-Padberg-Gruber as a Tool Management of Investment Risk

Alexander N. Nepp

Ural Federal University named after the First President of Russia Boris N. Yeltsin, Ekaterinburg, Russia

Abstract: In the article management issues about a bank investment portfolio are taken into account. The international Basel II agreements are analyzed. The influence of agreement principles on operational and market risks of banks is discussed. It is proved that application theories of portfolio will promote the decrease in risks and performance of the Basel II agreement. We explore the application of the algorithm Elton-Gruber-Padberg as a tool for the management of investment risk.

Key words: Investment risk • Elton-Padberg-Gruber' algorithm • RVOL • Portfolio models

INTRODUCTION

The first international convergence of banking capital, also known as Basel I, was accepted in 1988. However, Basel's capital requirements were not virtually sensitive to risk and it became their basic lack. Contradictions, therefore, are originated in portfolios and banking capital management practice.

The thirteenth principle of "Core principles for effective banking supervision" is read as follows: "Banking supervisors must be satisfied that banks have in place a comprehensive risk management process (including appropriate board and senior management oversight) to identify, measure, monitor and control all other material risks and, where appropriate, to hold capital against these risks" [1].

The final edition of capital requirements system was bound in June, 2006, also known as Basel II. The basic element of the new convergence is minimal capital requirements as well as Basel I. But in the new document these requirements are considered through a prism of the risks that banks assume. This important improvement gave impetus to the business process perfection in banking activity by means of banking risk-management higher-ranking.

The banking investment activity is one of the risk directions which is necessarily built on the foundation of Basel II. Banks minimize risks by means of the portfolio theory and competent management of investment portfolio [2]. This is characteristic of other institutional investors including insurers, non-governmental pension funds and investment funds [3].

The minimum capital depends on value of risks which are taken by banks, thereby a bank covers unexpected losses by its own funds [4], so the ratio of aggregate capital to assets is not below 8%.

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Elton-Gruber-Padberg algorithm as a tool for management of investment risk.

Basel Committee defines a market risk as the risk of losses in on and off balance-sheet positions arising from movements in market prices, including interest rates, exchange rates and equity values [7]. Capital requirements for the market risk are analyzed according to the operation which is entered on banking trading accounts [8].

The valuation risk of the investment project can be estimated according to the market risk. Banks, thereby, must create capital reserves to afford to liquidate valuation risks of investment portfolio. Attrition of frozen and low-profit assets has a positive result on a bank’s velocity and profit.
Usage of the portfolio theory in portfolios investments formation does not save banks of portfolio daily revaluation, but it does not append complexity to a technical service.

The Second Pillar – Supervisory Review Process. The supervisory review process of the Framework intends not only to ensure that banks have adequate capital to support all the risks in their business, but also to encourage banks to develop and use better risk management techniques in monitoring and managing their risks.

Supervisors are expected to evaluate how well banks are assessing their capital needs relative to their risks and to intervene, where appropriate. This interaction is intended to foster an active dialogue between banks and supervisors such that when deficiencies are identified, prompt and decisive action can be taken to reduce risk or restore capital. Accordingly, supervisors may wish to adopt an approach to focus more intensely on those banks with risk profiles or operational experience that warrants such attention.

Usage of portfolio methods and banking portfolio investment management will permit to shift into a low gear of market risks. It will become a cause to non-raising of the supervisor’s minimal requirement to a banking capital reserves.

The positive influence, thereby, of portfolio methods to a banking market risks, value of capital reserving, relationship between banks and supervisors, investor and customer is in the lap of the future.

Stocks quotes on the Moscow Interbank Stock Exchange are accepted as the initial data from January 1 to March 31, 2009. Stocks were selected to analyze from the investment portfolio of one of the Ural’s bank as of 2009. One week was accepted for a step of calculations.

Portfolio of Ural’s Bank yield for the first quarter 2009 is 76.60%, portfolio risk is 1.822%.

Let’s find the portfolio structure by mean of Elton-Gruber-Padberg algorithm [9]. It is necessary to specify the risk-free return for carrying out of calculations. Bond-equivalent yield is called risk-free with some assumption. In the capacity of yield we accepted average rate of return of government bonds and bonds of the most reliable issuers on the Russian securities market (11 %), therefore. Let’s examine a problem of Elton’s portfolio drawing up.

Equity is placed in the ordered of decreasing ratio yield to beta coefficient (RVOLi):

\[ RVOL_i = \frac{r_i - r_0}{\beta_i} \]  

(1)

\[ r_i - \text{expected rate of return i-bond;} \]
\[ r_0 - \text{risk-free rate;} \]
\[ \beta_i - \text{beta coefficient.} \]

Senior stock of company «Rostelecom» (RTKMP) get the greatest Trejnor’s value.

As from this stock we will add stock one by one and formula evaluation value \( \Phi_i \):

\[ \Phi_i = s_i^2 \frac{\sum_{j=1}^{n} r_i - r_0 \beta_{ij}}{1 + s_i^2 \sum_{j=1}^{n} \frac{\beta_{ij}}{\sigma_{ij}^2}} \]

(2)

\[ s_i^2 \] – dispersion of a market index;
\[ \sigma_{ij}^2 \] –variance of random error.

Comparing sizes \( \Phi_i \) with corresponding RVOLi until \( \Phi_i \) less RVOLi, we will get that since \( i = 6 \) this parity changes on the opposite. Stock from 1 to 5 will not have zero specific gravity in a portfolio and the others – zero. Thus, \( \Phi_i \) is the “cuttoff rate” for the Trejnor’s ratio.

After that it’s necessary to define what shares of stock are presented in this portfolio:

\[ Z_i = \frac{\beta_{ij}}{s_i^2 \sigma_{ij}^2} \left[ \frac{r_i - r_0}{\beta_i} - \Phi_k \right] \]

(3)

Values \( Z_i \) for \( i = k + 1...n \) rely equal to zero.

To define specific gravity of the first 5 stocks including in portfolio it is necessary to calculate sizes \( Z_i \). Values \( Z_i \) for \( i = 6...10 \) rely equal to zero.

Having divided every \( Z_i \) into sum \( Z_i \), we will get specific gravity of stock which will be included into the portfolio. Getting values are shares of stock in the portfolio.

The structure of the portfolio is represented in the figure 1.

The biggest share is assigned to «Lukoil»’s senior stock – 31.6%. The «Rusgidros»’s stock is the next – 24.4%. It is obvious, that this portfolio isn’t diversified. Only 33.2% portfolio’s funds are invested into the non-oil sector, that’s why portfolio’s value depends on the oil price basically. Such allocation of assets is sufficiently
The Portfolio's structure

Fig. 1: The portfolio’s structure by Elton-Gruber-Padberg algorithm

dangerous, even issuers are reliable. Therefore in practice portfolio’s managing directors often neglect theoretical calculations to avoid a narrow diversification on branches. Their operations are based on their own intellectual conclusions.

The portfolio expected rate of return is calculated as a weight average value of expectation portfolio yield, on condition that the share of the stock investment rate is taken as a weigher. That Elton’s portfolio return is 167.7% annual. Many management companies and mutual funds would envy such value but forecast has a striking feature. They fail. The portfolio’s beta coefficient is weight average value of all beta coefficients of this portfolio on condition that the share of stock investment rate is taken as a weighed [9]. The cumulative beta coefficient, thereby, of derived portfolio □, is 0.68. It’s indicative that the portfolio return change is slower than a market return

The Portfolio like this Is Conservative: By position of the Central Bank of Russia bank investment in the action of the credit organizations is reduced by its fixed capital, therefore the bank does not consider investment possibility in exclusive and ordinary actions of “Saving Bank”. Similar restrictions promoted decision-making of the bank to invest into other eight – less profitable emitters. As it is known in 2009 the bank sector’s stock became favorites of stock market, therefore absence in a portfolio the "Sberbank" stock was the second for the importance reason of the smaller rate of return of a banking portfolio in comparison with an optimum portfolio. To estimate financial result of absence of the stock of the emitter we compare its rate of return and rate of return of other eight stocks which are absent in an optimum portfolio and are present in a banking portfolio. Taking relations of the given values, we get value of 42 %. Much less than basic points 64 banks the received rate of return of portfolio because of absence in a portfolio the Savings Bank’s stock.

Also the share of funds invested into MMC «Norilsk nikel» is too much. It is also banking portfolio’s shortcoming. No matter how big and reliable this issuer is, it shouldn’t disregard by calculation of the optimal portfolio and increase share from 9.7% to 22.6%. It is necessary to cut it to 3.1%. Applying the same method, as with Savings Bank stock, we get a decrease in the total value of rate of return at 11 %.

It is possible to carry decrease in a share of Open Society "Gazprom" to one more of the reasons of the rate of return which has served to decrease in a portfolio from almost optimum 33.5 % to 27.2 %.

When using the theory of the formation of an optimum portfolio it is necessary to remember that at addition or sale of stock it is necessary to recalculate anew shares of existing stock and whether to correct on necessary size by purchases of sales of necessary quantity [10]. The error weight in decrease in total result of rate of return is 7 %.

The weight of an insufficient share of preference shares of Transneft and also their absence on the period end is 4 %, accordingly.

Let’s consider three portfolios: the Elton’s portfolio and the banking portfolio, which structure has been presented in drawing 4 and we will compare dynamics of the cost of these portfolios for 3 months 2009. Result we will represent in table 2.
Table 2: Results of change of portfolio value

<table>
<thead>
<tr>
<th>Value, million roubles</th>
<th>Profit (loss) for the period</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>01.01.2009</td>
</tr>
<tr>
<td>Banking portfolio</td>
<td>34.47</td>
</tr>
<tr>
<td>Elton’s portfolio</td>
<td>34.47</td>
</tr>
</tbody>
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These results come from the fact that, first, the banking portfolio was more diversified unlike the others. After all, at formation of Elton’s portfolio and Markowitz’s portfolio the fundamental analysis is not considered. Results of change of the portfolio value are tabulated.

The banking portfolio rate of return for the first three months 2009 has made 76.06 % annual. As we see, portfolio value changes “in a step” with change of an index of RTS to what factors a portfolio’s beta coefficients close to unit testify.

Output: For working out of recommendations on banking portfolio investment, it is necessary to structure and subject to the analysis the committed errors. As we have written above, errors and rate of return are not included models portfolio securities. At purchase of actions of other bank by the recommendation the increase in efficiency of interaction between divisions of bank for the purpose of control of the risks connected with decrease of settlement value of the capital could serve.

The recommendation is strict following to results of model. The factor of the subjective intervention will be reflected in increase of risks of banking portfolio management. Using portfolios theories will allow to lower banking portfolio’s risks and, hence, its market risks.

According to the international convergence Basel II it will allow to lower size of the bank’s capital reserve according to a Part I of the agreement.

At realization of components II application of offered techniques will have positive consequences: the supervisors will not have bases for increasing the minimal requirements of the bank’s capital reserve. From the point of view of the agreement’s component III regulating disclosing of the information, using the portfolio’s methods will be an original signal for clients and investors about the bank’s care of minimization and risks’ management. Using the portfolios theories as alternative tools of formation of portfolios will allow achieving growth of efficiency and decreasing the risks of financial institutions investment that will promote the international agreements performance.

REFERENCES

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