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MENADŽMENT RIZIKA U SLUŽBI INVESTIRANJA

U ovom radu dr Goran Anđelić istražuje i analizira međuzavisnost koja postoji između aktivnosti investiranja i rizika koji ove aktivnosti prate, sa ciljem dolaženja do konkretnih saznanja o mogućim merama i postupcima menadžmenta rizika, koji će omogućiti njihovo minimiziranje i pravovremeno reagovanje na krizna stanja.

naš izbor

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RISK MANAGEMENT FOR INVESTMENT PURPOSES

In his paper dr. Goran Andjelić discusses and analyses interdependency, the correlation, between the investment activities and risks inherent in these activities, with the objective of arriving at concrete knowledge of the possible measures and procedures in risk management that would allow for their minimization and a timely reaction to the crisis situation.

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Rizik, njegova vrsta, izvori i uticaj na tok i efekte aktivnosti investiranja postali su jedno od ključnih pitanja prilikom analize, procene efekata i donošenja svake odluke o investiranju. Činjenica je da svaku aktivnost karakteriše izvestan nivo rizika, koji u većoj ili manjoj meri utiče na tok i efekte te aktivnosti. Posebno interesantno pitanje jeste uticaj pojedinih vrsta rizika na tok i efekte aktivnosti investiranja, kao specifičnih poslovnih aktivnosti. Shodno tome, menadžment rizika je postao jedna od centralnih tema finansijskog menadžmenta u poslednjoj deceniji. Tehnike evaluacije rizika su se takođe razvile i postale značajan mehanizam za kvantifikaciju i komparaciju rizika raznovrsnih nivoa, i njihovog uticaja na aktivnosti investiranja. Menadžment rizika predstavlja osnovu za donošenje odluka o investiranju i procene očekivanih efekata od investiranja. Rizik, u širem smislu reči, obuhvata: *kreditni rizik, tržišni rizik, rizik likvidnosti i operativni rizik.* Ove vrste rizika su ključne za procese investiranja. *Kreditni rizik* se odnosi na potencijalni gubitak nastao kao nesposobnost druge strane da ispuni svoje zakonske obaveze po kreditnom poslu. *Tržišni rizik* se odnosi na mogućnost pojave gubitka kao posledice promena u tržišnim cenama ili faktora koji su korišćeni za procenu finansijskih instrumenata. *Likvidnosni rizik* se odnosi na gubitak nastao kao posledica nemogućnosti servisiranja obaveza. *Operativni rizik* se odnosi na rizik koji potiče od širokog spektra faktora: greške u procesima, tehnologijama i neuređenoj zakonskoj regulativi.

Ovi rizici su prisutni u procesu donošenja odluka o investiranju. Nekoliko faktora je posebno doprinelo povećanju interesovanja za menadžment rizika:

- nedovoljna uređenost finansijskih tržišta,
- povećana uloga finansijskih derivata u finansijskom posredovanju,
- nestabilnost tržišta i njihov uticaj na finansijske institucije,
- pritisak investitora na prinose povezane sa rizičnim investicijama,
- institucionalni zahtevi za pravni okvir menadžmenta rizika.

Prisustvo pravne regulative utiče na rizike najmanje na dva načina: prvo, može regulisati spremnost za preuzimanje rizika kao takvog, i drugo, rizične aktivnosti mogu u velikoj meri biti preuzete od strane finansijskih organizacija na taj način smanjujući potrebu za menadžmentom rizika u nefinansijskim organizacijama. Povećana uloga finansijskih derivata na finansijskim tržištima u velikoj meri utiče na procese upravljanja rizikom. Naime, bankarski krediti ustupaju mesto obveznicama i drugim visoko standardizovanim finansijskim proizvodima.

Postoje razlike u klasičnom i savremenom pristupu definisanju rizika. Klasično shvatanje rizik tretira kao posledicu neusklađenosti rokova pozajmljivanja i vraćanja sredstava. Savremen pristup riziku je dosta drugačiji. Uključuje u sebe tradicionalno shvatanje, ali ga proširuje na trgovanje i drugim finansijskim proizvodima, u skladu sa zahtevima klijenata i stanja i prilika na finansijskom tržištu.

Investitori vrše sve veći pritisak na procese kontrole rizika, u smislu razumevanja rizika u okviru postojeće zakonske regulative, i u smislu načina merenja ostvarenih prinosa. I ovo je jedan od zadataka menadžmenta rizika.

Investiciona aktivnost, u smislu ostvarenja određenih efekata, kao poseban segment poslovnog odlučivanja izuzetno je osetljiva na uticaj raznih faktora iz okruženja koji povećavaju rizike poslovanja i dovode do pojave kriznih stanja. Ukoliko se pođe od pretpostavke da celokupan proces koncipiranja, odabira i sprovođenja neke konkretne odluke o investiranju u velikoj meri zavisi od sposobnosti investitora da predvide - anticipiraju eventualne relevantne faktore okruženja koji značajno u budućnosti mogu uticati na tok i efekte aktivnosti investiranja, onda se sa pravom može reći da je aktivnost investiranja segment poslovne aktivnosti koji je pod uticajem najraznovrsnijih faktora iz okruženja, i koji utiču na znatno veće stope rizika nego kod drugih poslovnih aktivnosti.

Investiranje kao proces skopčano je, dakle, sa značajnim nivoom rizika. Najpre, elemenat vremena, koji u procesu investiranja dolazi do izražaja, značajno utiče na povećanje rizika koji celokupan proces investiranja nosi sa sobom. Pored toga, čitav spektar najraznovrsnijih faktora okruženja utiče na proces i tok aktivnosti investiranja u većoj meri nego u slučaju drugih

Risk, its type, sources and impact on the course and effects of investment activities, have become one of the key questions in analysis, effects assessment and decision making on investment. The fact remains that every activity is characteristic for a certain level of risk that to a greater or lesser extent impacts the course and effects of this activity. Especially interesting issue is the impact of certain types of risks on the course and effects of investment activities as a specific form of business activities. Thus the risk management evolved as one of the central topics of the financial management during the last decade. Risk evaluation techniques have also developed to become a significant mechanism both for different risk levels quantification and comparison, and their effect on investment activities. Risk management serves as basis for decision making on investment and anticipated investment effects assessment. The risk, in broader terms, covers the following: *credit risk, market risk, liquidity risk, and operational risks.* These types of risks are crucial for investment processes. *Credit risk* relates to the potential losses resulting from the inability of the other side to fulfil its credit servicing legal obligations. *Market risk* is the possibility of incurring losses as a consequence of market price changes or factors applied for assessment of financial instruments. *Liquidity risks* are losses incurred as a consequence of the failure to service liabilities. *Operational risk* is a risk resulting from a broad spectrum of factors: assessment errors, technologies and insufficient regulatory framework.

These are the risks inherent in the investment decision making process. Several factors have especially contributed to the bringing into focus the interest in risk management:

- inadequate regulation of financial markets;
- enhanced role of financial derivatives in financial intermediation;
- markets volatility and their effect on financial institutions;
- investors' pressure on yields linked with risk exposed investments;
- institutional demands for risk management regulatory framework.

The presence of regulatory framework, impacts risks in at least two different ways: firstly, it may regulate risk acceptance readiness as such, and secondly, risk exposed activities may be taken over by the financial organisations to a greater extent, thus reducing the need for risk management in the non-financial organizations. An enhanced role of financial derivatives on financial markets has a significant effect on the risk management process. Indeed, bank loans are ceding the place to bonds and other highly standardized financial products.

There are differences **in the classic and in contemporary approach to risk definition. The classic** understanding of risk is treating the risk as a consequence of unbalanced borrowing and repayment terms. **Contemporary** risk approach is significantly different. It incorporates both the traditional understanding of the risk, but expands it also to cover trading in other financial products, in accordance with the clients' requests and the situation and circumstances on the financial market.

Investors are stepping up the pressure on the risk control processes, in the sense of risk awareness within the regulatory framework which is in place, but also in the sense of the ways for measuring the achieved yield. This is yet another of the risk management tasks.

Investment activity, in terms of achieving certain effects, as a separate segment of the business decision-making process, is extremely sensitive to the influences of various factors from the environment, which are increasing risk exposure of business operations and are causing crisis to occur. Under the assumption that the entire process of conceiving, selecting and implementing a concrete investment decision greatly depends on the capability of an investor to forecast and anticipate eventual relevant environment related factors which may significantly in the future influence the course and effects of investment, then it may be rightfully stated that the investment activity is a segment of business activities which is under the influence of the most diverse environment factors, that are impacting by far higher risk rates than is the case in other business activities.

Therefore, investment as a process, is linked with a significant level of risk exposure. Primarily, the element of time which is emphatic in the investment process, significantly impacts risk increase which the entire investment process embodies. In addition, there is an entire spectrum of most diversified environment factors effecting

oblika poslovnih aktivnosti.

Rizici sa kojima se potencijalni investitori najčešće susreću mogu se podeliti u grupu: tržišnih, kamatnih, deviznih, rizika likvidnosti i terminskih rizika.

Upravo iz ovih razloga u radu će se istražiti i analizirati međuzavisnost koja postoji između aktivnosti investiranja i rizika koji ove aktivnosti prate, sa ciljem dolaženja do konkretnih saznanja o mogućim merama i postupcima menadžmenta rizika, koji će omogućiti njihovo minimiziranje i pravovremeno reagovanje na krizna stanja.

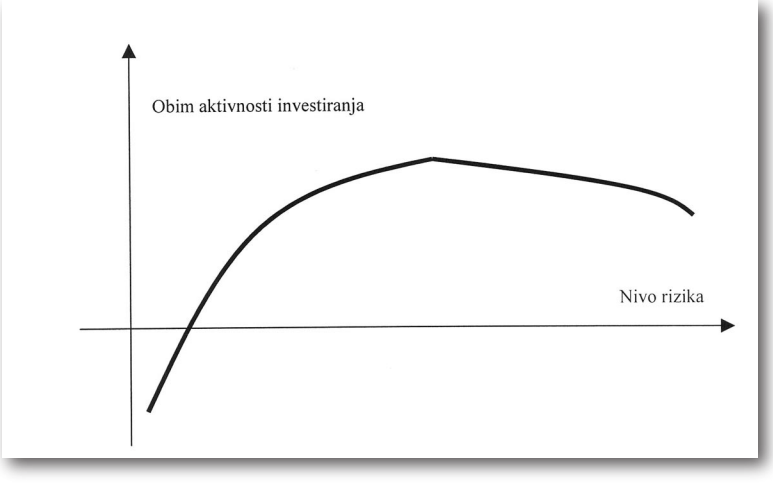
Kongruentnost investiranja i rizika

Između investiranja i određene stope rizika koja je prisutna u aktivnostima investiranja postoji značajna međuzavisnost. Naime, ne postoji investiranje kao poslovna aktivnost koja sa sobom ne nosi makar i najmanji nivo rizika. Zbog toga je od ključne važnosti sagledati faktore koji doprinose nastanku kriznih stanja, i još važnije proceniti njihov uticaj na tok i efekte aktivnosti investiranja. Prilikom činjenja bilo kakve aktivnosti investiranja izvesna doza rizika uvek postoji, i ona varira u zavisnosti od različitih faktora. Uspešnost menadžera se upravo ogleda u njegovoj sposobnosti da proceni i vrednuje značaj faktora rizika na tok i efekte aktivnosti investiranja i samim tim da oceni jačinu veze između pojedinog nivoa rizika i očekivane stope prinosa od investiranja.

Spremnost i mogućnost investitora da se prilagođava stalno novim, izmenjenim uslovima poslovanja definiše se kao njegova fleksibilnost. Fleksibilniji investitori lakše upravljaju promenama, brže se prilagođavaju novim uslovima poslovanja i samim tim rizici sa kojima se mogu susresti su znatno manji. Pored fleksibilnosti, ključni momenat upravljanja rizikom jeste sposobnost investitora, tačnije menadžera, da na vreme predvidi promene i prilagodi se njima. Dakle, predviđanje i fleksibilnost jesu na nivou investitora dve ključne strategije menadžmenta rizika. U zavisnosti od uspeha koji se ostvaruje ovim strategijama zavisi i veličina rizika koju sa sobom nosi konkretna aktivnost investiranja. Investitor koji na vreme uočava eventualne probleme, krizna stanja i na vreme reaguje na izazove iz okruženja, ima veće šanse za uspešno poslovanje i za preduzimanje takvih aktivnosti investiranja koje će biti skopčane sa manjom dozom rizika.

Ukoliko bismo šematski prikazali međuzavisnost između visine rizika i obima aktivnosti investiranja videli bismo da do određenog nivoa rizika obim aktivnosti investiranja pokazuje tendenciju porasta, što se može objasniti spremnošću investitora da prihvati određeni nivo rizika sve dotle dok procenjuje da je granična korisnost koja se ostvaruje dodatnim ulaganjem veća nego što bi bili eventualni gubitci koji mogu nastati kao posledica određenog nivoa rizika ostvarenja finansijskog rezultata, da bi potom obim aktivnosti investiranja počeo da opada upravo srazmerno porastu nivoa rizika.

Slika 1.



Menadžment rizika u službi investiranja

Upravljanje rizikom, odnosno, menadžment rizika, omogućava investitoru da na vreme anticipira sve relevantne faktore okruženja, kreira konkretne strategije za odgovore na izazove iz okruženja i na taj način direktno utiče na visinu i jačinu uticaja pojedinih vrsta rizika na tok i efekte aktivnosti investiranja. Pod ambicijom investitora da upravlja promenama

the process and course of investment activities, to a much larger extent than is the case of some other forms of business activities.

The risks, most frequently encountered by the potential investors, may be divided into the following groups: market risks, interest rate risks, foreign exchange risks, liquidity risks and maturity gap risk.

Actually it is for this reason that this paper tends to investigate and analyse interdependency, the correlation, between the investment activities and risks inherent in these activities, with the objective of arriving at concrete knowledge of the possible measures and procedures in risk management that would allow for their minimization and a timely reaction to the crisis situation.

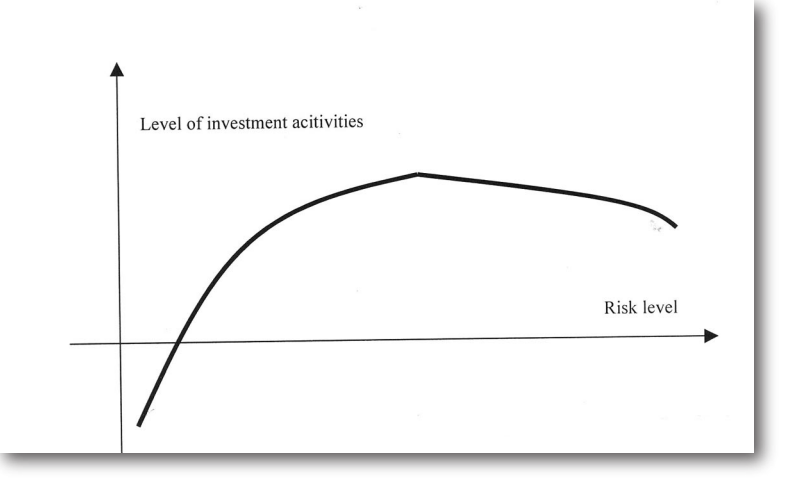
Congruent investment and risk

Between investment and a certain risk exposure rate which is present in the investment activities, there is a significant interdependence. Indeed, there is no investment as a business activity that does not embody at least a slightest level of risk. Thus it is crucially important to assess all the factors contributing to the arising of the crisis situations, and more importantly, to evaluate their impact on the course and effects of the investment activities. When undertaking any of the investment activities, a certain dose of risk is always inherent, and it varies depending on different factors. The success of any given manager is actually reflected in his or her capability of assessing and evaluating the significance of the risk exposure factor on the course and effects of the investment activities, and thus on the evaluation of the strength of the correlation between certain risk exposure levels and the anticipated rate of return on any given investment proposition.

Readiness and capabilities of an investor to adjust to continuously novel, or changing conditions of conducting business operations, is being defined as his flexibility. A more flexible investor is better adapted to manage changes, to adjust faster to new operating conditions and, thus, risks to be encountered are substantially lower. In addition to flexibility, the key risk management moment is the capability of an investor, or more precisely, of a manager, to forecast changes on time and adapt to the same. Thus, *anticipation and flexibility* are the two key strategies for risk management at the investor level. Depending on how successful these strategies prove to be, depends in turn the magnitude of risk involved in any concrete investment activity. An investor, who is to identify in good time eventual problems, crisis situations and who reacts timely to the environment challenges, will have greater chances for successfully conducting business and for undertaking investment activities that involve a slighter amount of risk.

If we are to present a diagram of interdependency between high risk exposure and the volume of investment activities, we would find that up to a certain risk exposure level, volume of investment activity shows a tendency of growth, that may be explained by the investor's readiness to accept a certain risk exposure level, for as long as he should estimate that the marginal utility, resulting from additional investment, exceeds the eventual losses that may be incurred as a consequence of the given level of risk in achieving the financial result. Thereupon, the volume of investment activity would start to fall actually in proportion with the growth of the risk exposure level.

Figure 1



leži upravo njegova želja da sagledavanjem stanja i uslova iz okruženja aktivnije utiče na efekte svojih odluka o investiranju, u smeru maksimiziranja rezultata i istovremenog minimiziranja svih izvora najraznovrsnijih rizika sa kojima se investitor susreće. Aktivnosti investiranja su po mnogo čemu specifične, naročito kada su u pitanju vrste i veličine rizika sa kojima se potencijalni investitori susreću u toku donošenja i odabira alternative investiranja. Cilj svakog investitora jeste da maksimizira prinos na uložena sredstva, u smislu da za što kraći vremenski period ostvari što veći povrat uloženih sredstava. Prilikom izrade investicionog plana i kreiranja strategije investiranja investitor se prvenstveno rukovodi visinom prinosa koji će u nekom, unapred definisanom periodu vremena, ostvariti.

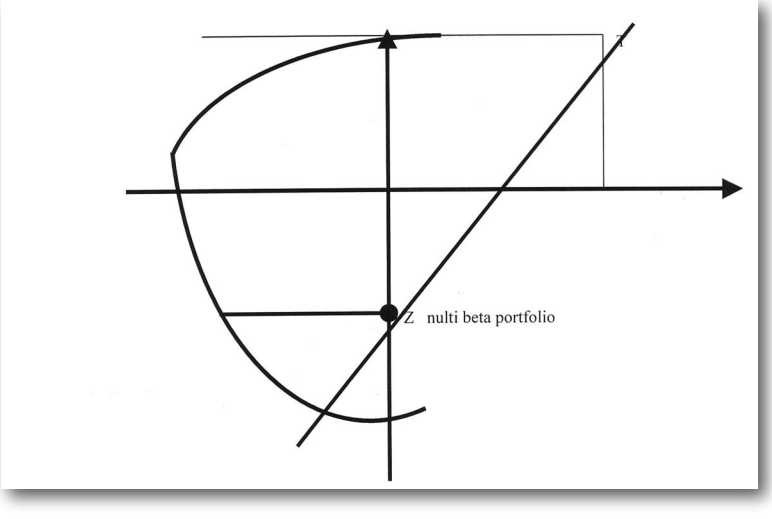
Investitor za svaku aktivnost investiranja procenjuje koliki priliv novčanih sredstava će biti ostvaren kao posledica činjenja te aktivnosti.

U teoriji su prisutne dve grupe stavova po pitanju upravljanja (menadžmenta) rizikom investiranja. Klasično stanovište bazirano je na pretpostavci da se povećanjem portfolia istovremeno utiče na smanjenje rizika. Diverzifikacijom portfolia, u smislu raspolaganja što većim brojem raznovrsnijih finansijskih instrumenata utiče se na znatno opadanje rizika investiranja. Investitori po ovoj teoriji treba da teže vođenju takve politike investiranja, kojom će uticati na što veću diverzifikaciju svog investicionog portoflia, jer se sa povećanjem broja raznovrsnih finansijskih instrumenata u posedu jednog investitora utiče na stvaranje razuđenog portfolia kojim se po ovoj teoriji postiže smanjivanje rizika investiranja. Poseban značaj u procesu diverzifikacije rizika ima tzv. internacionalna diverzifikacija koja poprima značajne dimenzije sa intenzivnim procesima svetske globalizacije. Sveprisutna je težnja investitora za internacionalizacijom aktivnosti investiranja, a sve sa ciljem minimiziranja rizika i maksimiziranja prinosa investiranja.

Sa porastom broja transakcija na finansijskom tržištu i sa nastankom prvih finansijskih kriza, počela su da nastaju prva odstupanja stvarnih od modelom predviđenih kretanja. U takvim uslovima očigledno je bilo da konkretan model više nije u stanju da odslikava realno stanje. Bez obzira na aktivnosti investitora u smislu investiranja u raznovrsne finansijske instrumente na tržištu rizici po osnovu vlasništva nad tim instrumentima nisu opadali, nego, naprotiv, povećavali su se.

U takvim uslovima nastao je novi model menadžmenta rizika - **portfolio model.** Ovim modelom se stavljaju u odnos matematičko - statističke metode proučavanja prinosa na investirana sredstva sa rizicima koje takve aktivnosti prate. U kreiranju modela pošlo se od empirijski verifikovane pretpostavke da se sa ulaganjem u kupovinu finansijskih instrumenata rizik portfolia najpre smanjuje do određenog nivoa, a da zatim ponovo počinje da raste. Drugim rečima, portfolio rizik se ponaša kao obrnuta sinusoida. Komparirajući na istom grafikonu kretanje portfolio rizika sa stopom prinosa od određenih aktivnosti investiranja u tačci u kojoj je kriva stope prinosa tangenta krivi portofolio rizika dolazi se do nivoa rizika na kojem je prinos investicionog portfolia maksimiziran. U toj tački na grafikonu se uočava pri kom nivou portfolio rizika je prinos portfolia maksimalan.

Slika 2.[1]



[1] Satyajit Das, Risk Management and Financial Derivatives, 2002. godina, strana 103.

Risk management for investment purposes

Risk management allows an investor to anticipate in good time all the relevant environment factors, to create concrete strategies in response to challenges of that environment, and thus impact directly the level and strength of certain types of risk exposure on the course and effects of investment activities. Underlining the ambition of an investor to manage changes stands his wish, through assessment of the status and conditions of the environment, to gain a more active impact on the effects of his investment decisions, with the aim of maximising results and simultaneously, minimising all sources of most diverse risks that this investor may encounter. Investment activities are in many ways specific, especially in terms of types and size of risks that the potential investors are encountering in the process of making and selecting investment alternative decisions. The objective of every investor is to maximise yield on invested funds, in the sense of achieving over as short a period of time as possible, the highest return on invested funds. In preparing an investment plan and creating an investment strategy, the investor is primarily guided by the level of yield to be achieved over some, in advance defined, period of time. The investor estimates for every investment activity the amount of money to be gained as a consequence of that particular activity.

In theory, there are two groups of stands regarding the issue of investment risk management.

The classic stand is based on the assumption that the portfolio enlargement simultaneously affects the risk exposure decrease. Portfolio diversification, in the sense of disposing with as large a number as possible of diversified financial instruments, has an effect on substantial lowering of investment risk exposure. The investors, according to this theory, should tend towards conducting such investment policies that will allow them to influence as large a diversification of their investment portfolio as possible, because with the increased number of diversified financial instruments in possession of an investor, impact is made on creation of a diversified portfolio in which, according to this theory, lowering of the investment risk is achieved. Special significance in the process of risk diversification is occupied by the so called international diversification which gains substantial proportions with intensive processes of world globalisation. There are omnipresent strives of investors for internationalisation of investment activities, always with the aim to minimise risk and maximise investment yield.

With the growth of the number of transactions on financial markets and the occurrence of initial financial crisis, the first digressions started of the real movements from the model forecasted ones. Under such conditions, it became obvious that the concrete model was no longer able to reflect the real state of facts. Regardless of the investors' activities in the sense of investing into diversified financial instruments on the market, the risks involved in the ownership of such instruments did not decrease or fall, but on the contrary, they started to increase and grow.

In those circumstances, the first risk management model was created, **the portfolio risk management model.** This model places in proportion mathematical and statistical methods of the study of yields on invested funds, with the risk exposure involved in such activities. Creation of this model was initially based on the empirically verified assumption that with the investment into purchase of financial instruments, portfolio risk exposure initially decreases up to a certain level, to start growing again at a certain point. In other words, portfolio risk exposure is behaving as a reversed sinusoid. By comparing on the same chart portfolio risk exposure movement with the yield rate of certain investment activities, at the point in which the curve of the yield is the tangent to the portfolio risk curve, we arrive at the risk level on which the yield of investment portfolio is maximised. In that point of the graph we can observe at what portfolio risk level that portfolio yield is at its maximum.

Such an approach to the portfolio risk exposure and yield analysis means the division of portfolio risk into two components:

- systemic risk component; and
- non-systemic risk component.

Systemic risk is that element of portfolio risk that is possible to be anticipated and projected into a model.

Non-systemic risk is that element of portfolio risk that can not be anticipated in advance, and is

Ovakav pristup analizi portfolio rizika i prinosa podrazumeva podelu rizika portfolia na dve komponente:

- sistemsku komponentu rizika i
- nesistemsku komponentu rizika.

Sistemski rizik je onaj elemenat portfolio rizika koji je moguće predvideti - anticipirati i projektovati u model.

Nesistemski rizik je onaj elemenat portfolio rizika koji nije moguće unapred predvideti, koji je posledica uticaja nepredvidivih faktora kako internog tako i eksternog okruženja i kao takav značajno utiče na visinu i promene portfolio rizika.

Matematički se ovaj odnos može predstaviti na sledeći način:

R= A+B,

gde je

A - sistemska komponenta rizika i

B - nesistemska komponenta rizika.

U ukupnoj veličini rizika portfolia procena je da sistemski rizik čini oko 40%, a nesistemski rizik oko 60% ukupnog rizika.

Menadžment rizika ima izuzetnu ulogu u kreiranju i upravljanju aktivnostima investiranja. Cilj investitora jeste sagledavanje u što većem obimu svih relevantnih faktora rizika koji prate aktivnosti investiranja, a sa ciljem dolaženja do pouzdanih informacija o tome na koji način i kojom dinamikom će se određeni faktori rizika menjati i na taj način uticati na ostvarenje finansijskog rezultata od investiranja. Na osnovu ovih saznanja investitori donose odluke o investiranju, i u toku implementacije aktivnosti investiranja preduzimaju određene korektivne akcije sa ciljem maksimizacije efekata od aktivnosti investiranja.

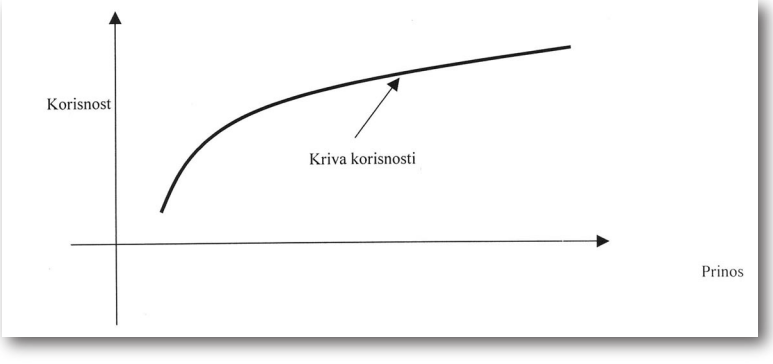
Senzibilnost investicija na rizike

Senzibilnost ili osetljivost investicija na određene vrste rizika zavisi u velikoj meri od specifičnosti same aktivnosti investiranja, faktora eksternog i internog okruženja, vrste i veličine rizika. Različiti tipovi investiranja senzibilni su na različite vrste rizika.

Jedna od polaznih premisa prilikom analize senzibilnosti investicija na nivo rizika jeste pitanje određenja pojma marginalne korisnosti. Praktični efekti marginalne korisnosti u procesu donošenja odluka o investiranju je da su investitori manje spremni da rizikuju dobra i vrednosti koja poseduju u funkciji ostvarenja dodatne zarade. Razlog ovome leži u činjenici što je poslednji zarađeni dinar u očima investitora vredniji nego sledeći. Recimo, posmatrajmo investitora kome na raspolaganju stoje dve mogućnosti: jedna je sigurna zarada od 10 dinara, a druga je sa 50% verovatnoće da će zaraditi 5 dinara i 50% verovatnoće da će zaraditi 15 dinara. Obe varijante će rezultirati prinosom od 10 dinara, ali za koju će se investitor opredeliti? U slučaju prve opcije investitor će ostvariti prosečnu korisnost. Sa drugom opcijom investitor će ostvariti manju korisnost u odnosu na prvu, iz razloga što je rizik u slučaju druge opcije veći. Osobina investitora da bira siguran prinos u odnosu na onaj koji je manje verovatan, kada, u proseku, obe alternative na kraju rezultiraju istim prinosom, poznata je u praksi kao **averzija rizika (risk aversion).**

Za rešavanje problema kreiranja portfolia najracionalniji pristup je uvođenje u analizu i proučavanje **funkcije korisnosti** koja definiše vezu između prinosa i nivoa ostvarene korisnosti.

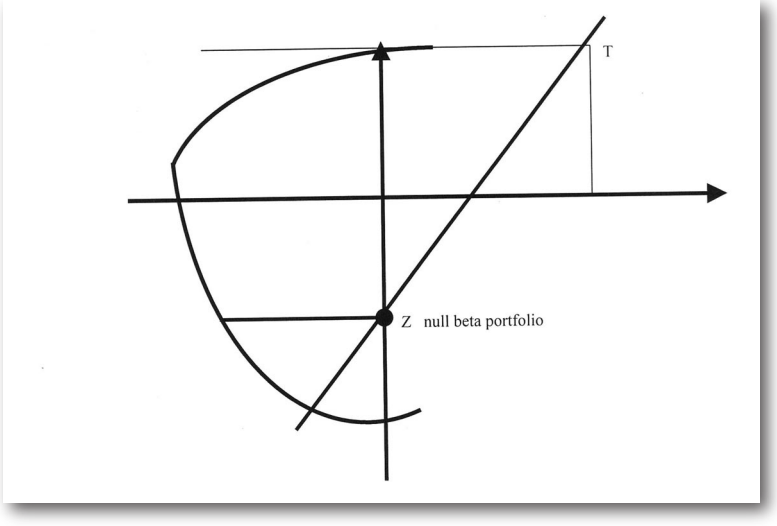
Slika 3.



Na horizontalnoj osi je stopa prinosa, dok vertikalna osa pokazuje korisnost investitora za odgovarajući prinos. Ova funkcija korisnosti ima tri ključne karakteristike koje su zajedničke svim funkcijama korisnosti: uvek je pozitivna, ima oblik krive koja dostiže svoj ekstrem i kako stopa prinosa raste tako korisnost

a consequence of the influence of unpredictable factors, both of internal and of external environment, and as such bears a significant impact on the level and changes in the portfolio risk exposure.

Figure 2[1]



Mathematically speaking, this relationship may be expressed in the following manner:

$$R = A + B$$

whereby:

A is a systemic risk component, and

B is a non-systemic risk component

Within the total size of the portfolio risk, estimate is that the systemic risk amounts to some 40%, and the non-systemic risk to some 60% of the total risk exposure.

Risk management has an exceptional role in the creation and management of investment activities. The target of the investors is the assessment, to as great an extent as possible, of all the relevant risk factors that are involved in the investment activities, with the objective of arriving at reliable information on the manner and dynamics with which certain risk factors will change, and in that way of influencing the achievement of the investment financial result. Based on this knowledge, the investors undertake to make their investment decisions, and during the implementation of the investment activities they undertake certain corrective actions aimed at maximising the effects of the investment activities.

Investment risk sensibility

Sensibility or sensitivity of investments to certain types of risks greatly depends on the specific features of the particular investment activity, external and internal environment factors, and the type and size of risk involved. Various types of investments are sensitive to different type of risks.

One of the basic assumptions in the analysis of investment sensibility to the risk exposure level is the issue of determining the notion of utility function. Practical effects of utility function in the investment decision-making process are that the investors are less inclined to place at risk the goods and values that they possess in the function of achieving additional gains. The reason here lies in the fact that the last earned dinar in the eyes of an investor is more valuable that any next or the forthcoming one. Let us observe an investor faced with two opportunities: one is to achieve a certain gain of 10 dinars, and the other one is with 50% probability that he may earn 5 dinars, and a 50% probability that he may earn 15 dinars. Both alternatives will result in the yield of 10 dinars, but which one of them will be the one adopted by the investor? In the case of the first option, the investor will achieve the utility function. In the second option, the investor will gain lower utility in respect to the first one, for the reason that the risk involved in the second option was higher. The investor's characteristic to choose a safe yield in comparison with the one that is less probable when, on an average, both alternatives ultimately result in the same yield, is recognized in practice as **the risk aversion.**

For purpose of resolving problems when creating portfolios, the most rational approach would be an introduction into the analysis and study of **the utility function** which defines the connection between yield and the level of achieved utility.

[1] Satyaji Das, Risk Management and Financial Derivatives, 2002, page 103.

opada (smanjuje se marginalna korisnost). Matematički posmatrano, funkcija korisnosti ima pozitivan prvi izvod i negativan drugi izvod. Postoji širok spektar funkcija korisnosti koje ispunjavaju ovaj kriterijum. Funkcija koja je najčešće upotrebljavana u svrhu kreiranja portfolia je poznata kao eksponencijalna funkcija korisnosti. Ona ima formu:

$$U(r) = 1 - e^{-@r,}$$

gde je:

@ - parametar koji pokazuje nivo odbacivanja rizika

U – nivo korisnosti za odgovarajući nivo prinosa i

r – prinos.

Menjajući parametar koji pokazuje nivo odbacivanja rizika moguće je kreirati model koji pokazuje preferencije investitora od visoko rizičnih do nisko rizičnih portfolia. Investitor koji ne pridaje značaj riziku posmatra svaki dodatni prinos kao jednako poželjan. Kao rezultat ovakvog pristupa, izbor investitora će biti uvek imovina sa najvišim očekivanim prinosom bez obzira na potencijalne gubitke. Investitor koji izuzetno pridaje značaj visini rizika investiranja pridaje vrlo malu dodatnu korisnost većim prinosima i čvrsto stoji na stanovištu kreiranja portfolia sa stabilnim prinosima i niskom verovatnoćom gubitka. Upravo na ovoj činjenici se bazira savremeni pristup investiranju.

Zaključak

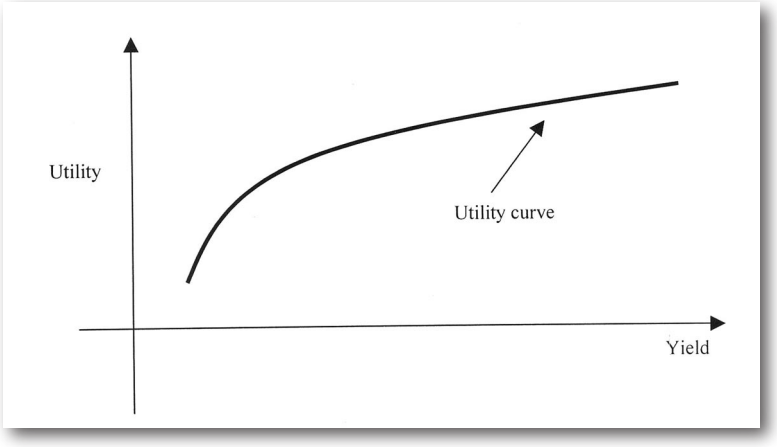
Menadžment rizika u službi investiranja ima za zadatak da odgovori na stalno prisutne izazove u procesima donošenja odluka o investiranju i njihove implementacije. Teorija i praksa je potvrdila da je sistemskim i konzistentnim pristupom pitanjima upravljanju (menadžmenta) rizikom moguće minimizirati rizike koje aktivnosti investiranja nose sa sobom, kao i da je moguće anticipirati kritične tačke u procesima aktivnosti investiranja i shodno tome, adekvatno reagujući, maksimizirati efekte investiranja.

Menadžment rizika u sebe uključuje analizu svih faktora okruženja (internog i eksternog) koji utiču na tok i efekte aktivnosti investiranja, kao i čitav niz mera koje se odnose na analizu korisnosti i procene očekivanih efekata investiranja. Dakle, u takvoj kombinaciji moguće je optimizirati poslovne odluke o investiranju i shodno tome maksimizirati efekte investiranja. Upravo u ovoj konstataciji leži naučna vrednost ovoga rada, jer ukazuje na moguće mehanizme i postupke u procesima menadžmenta rizika čijom primenom se može obezbediti efikasno upravljanje i kontrola rizika investiranja, a samim tim i maksimizacija efekata investiranja.

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3. Satyajit Das, *Risk Management and Financial Derivatives*, 2002.
4. Poitras dr, *Risk Management, Speculation and Derivative Securities*, New York, 2002.

Figure 3



On the horizontal axis is the yield rate, while the vertical axis presents the utility of investor for the corresponding yield. This function of utility has three key characteristics that are common to all the utility functions: they are always positive, a function has the form of a curve which reaches its extreme, and as the yield rate grows, so the utility falls (marginal utility diminishes). Mathematically speaking, utility function has its first derivation and a negative second derivation. There is a broad spectrum of utility functions that fulfil this criterion. The function which is most often applied for purpose of portfolio creation is known as the exponential utility function. It has the following form:

$$U(r) = 1 - e^{-@r,}$$

whereby:

@ is the parameter indicating the level of risk rejection;

U is the level of utility for the corresponding level of yield; and

r is the yield.

By changing the parameter indicating the level of risk rejection, it is possible to create a model which shows the investor preferences, from highly risky to the low risk portfolios. The investor, who is not highly concerned with the risk exposure, considers every additional yield as equally desirable. As a result of this approach, the investor's choice will always be the assets with the highest anticipated yield, regardless of potential losses. The investor who is attaching an extremely high significance to the level of the investment risk exposure, will attach very low additional utility to higher yields and will firmly support the view that portfolio should be created with stable yield and low probability of losses. This is actually the fact on which the contemporary approach to the investment is founded.

Conclusion

Risk management for purpose of investment has the task to respond to the constantly present challenges in the investment decision-making processes and the implementation of the investment decisions. The theory and practice have both confirmed that it is possible, through a systemic and consistent approach to the risk management issues, to minimize risks inherent in the investment activities, and that it is also possible to anticipate critical points in the investment activities processes, thus by adequate reaction to maximize investment effects.

Risk management embodies the analysis of all the environmental facts (both internal and external) that have an impact on the course and effects of investment. Therefore, it is possible, in such a combination, to optimize investment business decisions and maximize investment effects accordingly. It is actually in this conclusion that rests the scientific value of this paper, because it highlights the possible mechanisms and procedures in the process of risk management, and demonstrates that, once they are applied, an efficient investment risk management and control can be put in place, and thus maximization of the investment effects achieved.

Rezime

Rizik jeste karakteristika svake čovekove aktivnosti (pa i poslovne), i predstavlja njen nezaobilazan segment. Investiranje predstavlja, takođe, nezaobilazan segment svake poslovne aktivnosti. Procene toka i efekata aktivnosti investiranja su uvek imale izuzetnu važnost prilikom donošenja odluka o investiranju. Shodno tome, posebno značajno mesto u ovim procesima imaju aktivnosti koje za svoj cilj imaju procenu trenutka pojavljivanja i uticaja pojedinih rizika na tok i efekte aktivnosti investiranja. Sa porastom obima aktivnosti investiranja mesto, uloga i značaj koju menadžment rizika ima, postaje sve značajniji. Zadatak menadžmenta rizika nije samo da predvidi nastanak i uticaj pojedinih rizika na tok i efekte aktivnosti investiranja, nego i da omogući kreiranje i implementaciju niza mera i postupaka sa ciljem minimiziranja uticaja rizika na tok i efekte ovih aktivnosti. Shodno tome, menadžment rizika je evoluirao u smislu da omogući na sistemskim, kontinuelnim osnovama procenu snage i uticaja pojedinih vrsta rizika na tok i efekte aktivnosti investiranja, uz istovremeno pružanje realnih osnova za kreiranje i implementaciju mera i postupaka koje će omogućiti efikasan menadžment rizika, u smislu kontrole njegovog nastanka i uticaja na aktivnosti investiranja. Imajući gore izneto u vidu, u radu je proučavano mesto, uloga i značaj menadžmenta rizika u službi investiranja, sa ciljem minimiziranja rizika i maksimiziranja efekata od aktivnosti investiranja.

Ključne reči: menadžment rizika, rizik investiranja, investiranje, averzija rizika, funkcija korisnosti, kongruentnost investiranja i rizika.

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3. Satyajit Das, *Risk Management and Financial Derivatives,* 2002.
4. Poitras dr, *Risk Management, Speculation and Derivative Securities,* New York, 2002.

Summary

Risk is the characteristic of every human (and business) activity and it represents its unavoidable segment. Investing represents, also, unavoidable segment of every business activity. Evaluation of the process and effects of the investing activities always had remarkable importance in investment decision making. Accordingly, especially important place in these processes are activities that have for their aim the evaluation of the appearance time and influence that certain risks have on process and effects of the investing activities. With increasing volume of the investing activities, place, role and importance that risk management has, are becoming more significant. Risk management task is not only to predict creation and influence of certain risks on process and effects of the investing activities, but it should enable creation and implementation of the series of measures and procedures with the aim of minimizing risk influence on process and effects of these activities. Accordingly, risk management has evolved with the aim of enabling, on systematic and continuous base, the evaluation of the strength and influence that certain risk categories have on process and effects of the investing activities. Simultaneously, it provides realistic basis for creation and implementation of the measures and procedures that will enable efficient risk management, regarding control of its appearance and influence on investment activities. In that sense this work presents the place, role and importance that risk management has in investment activities, with the aim of the risk minimization and maximization of the investment activities effects.

Key words: risk management, investment risk, investments, risk aversion, utility function, congruent investment and risk.