

The Genesis and Metamorphoses of Risk

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Abstract Each business activity and also an individual person face risk every day. But what is risk? People have different attitudes to risk. Natural survival instincts make some people use all possible means to avoid injury or loss. These decisions are not decisions but more of inner instincts of survival. If we move from an individual to an organization, standards and rules become more complex and more formal. When activities become more complex, instinctive and institutional patterns of behaviour forming the basis of personal risk management become inadequate and decisions become more complicated. The theory of risk has been a subject dealt with in many available books by domestic and foreign authors and risk management as such has been a subject of detailed research. We can even claim it constitutes an independent part of the theory of economy.

Keywords Risk, decisions, uncertainty, investment alternative, undesirability

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1. Introduction

People have always liked entertainment, games and bets. Even though they do not only pursue their leisure but lose their money as well,¹ it is not clear whether they have given the likelihood of their successes and failures a serious thought. An accident was considered a part of the nature or message from gods. People held absolutely fatalistic attitude towards the future. In 1650s the French mathematician Blaise Pascal, who is also considered a father to modern exact approaches to selection, chance and probability, started to deal with the theory of probability. In centuries to follow other great personalities like Bernoulli, Bayes, Gauss, LaPlace and others developed his ideas. It is their studies and works that enable us to understand the world of uncertainty with much more efficiency. People living before Pascal considered risk something inevitable, out of their control. But even nowadays there is no definite approach to risk. We are able to count orbitals in our solar system, clone animals, modify food genetically, etc. but when it comes to predicting a particular share price in a month time, we find ourselves in the dark. Despite the knowledge potential of the mankind is increasing inevitably, there is still no sufficiently reliable methodology to predict, quantify, and minimize or diversify risk.

2. Uncertainty versus Risk

It may seem that the terms risk and uncertainty are synonyms, but it is not so². Each of these values has

a different character. Uncertainty is a broader term related to such variations in which probability of occurrence or size cannot be measured. Moreover, uncertainty is the probability of the result of an event which has to be borne by all of us regardless of whether this event bears upon us or not. But in the moment we decide to undergo this uncertainty, the risk that is created concerns us only. Risk is something borne by an individual or a team as a consequence of undergoing an uncertainty. But uncertainty itself does not imply that somebody must take the risk. We all bear the uncertainty of Nigerian exchange rate, but that does not mean somebody will trade this currency. In general we know three basic types of uncertainty:

- known,
- unknown,
- undetectable.

Known uncertainty is certain in its occurrence and can be determined using math formulas providing there are known and well defined facts. *Unknown uncertainty* is not possible to be derived explicitly. This one is detected in the course of time, events and activities, and therefore its behaviour is detected by the use of simulations and other form of approximations. *Undetectable uncertainty* is revealed after the actual event has taken place. Typical examples are natural disasters. Known certainty is a subject to traditional analysis that relies on known values. Risk analysis deals with unknown and undetectable certainty.

Uncertainty can also be divided into:

- *endogenous uncertainty*, related to the company internal processes and reflecting uncertainties within those particular projects that affect technical difficulty, timetable and uncertainty of project funding.

¹ E.g an excellent novel by M. F. Dostoyevsky – The Gambler

² Experts strictly distinguish risk and uncertainty.

- *exogenous uncertainty*, closely related to market factors such as changes in demand, competitive behaviour, changes in interest rates and price levels, etc.

Uncertainty is an objective form of the real world around us and is manifested in ambiguity during real processes. There are two aspects of uncertainty:

- 1) ontological aspect – uncertainty is conditioned by existence of randomness as a manifestation of necessity,
- 2) gnoseological aspect – uncertainty is conditioned by the incomplete display of real phenomena in human consciousness.

The source of uncertainty is then an object as well as an entity. Taking into account its character and source, uncertainty is an objective element accompanying human activities focused on influencing and transformation of the future. When preparing these activities, a decision-making body³ is not able to spot all causal links between selected procedure (e.g. selected investment alternative) and its consequences. Uncertainty of the consequences of a selected procedure may only be smaller or bigger, i.e. it cannot be removed completely. Uncertainty creates a danger that the implementation of a certain alternative will cause a negative variation of planned or expected effects and those that were achieved. The danger of negative variations is seen as *risk*. The history of the term risk is not clear. We can find different opinions regarding the language of origin. The term risk (Petit 2007) is first seen in Italian language regarding sailing - the word *risico* represented the ledge which was to be avoided. Then this term started to be used to describe exposure to adverse circumstances. (Acerbi 2002) claim the word risk comes from Arabic *risq* or Latin *riscum*. The word *risq* means random outcome and *riscum* means a chance but also an adverse event. The term risk is not only known in Europe. Damodaran (2012) says that the Chinese expression for risk in Chinese characters in Figure 1 is the best representation of its meaning.

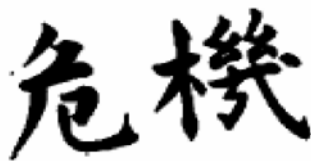


Figure 1. The word risk in Chinese characters.

The first character means danger and the other one opportunity. These two characters express the relation between the opportunity, which can be understood as profit and danger which represent risk.

A modern English word *risk* originated in 17th century and was derived from the French word *risque*, which is nowadays mostly the synonym of a negative event.

There are several technical, economic or social definitions for the term *risk*. There is no generally accepted definition. Just to illustrate this, let us look at some of the definitions. Those most often quoted define risk as:

- the uncertainty related to possible occurrence of events,
- the danger increasing frequency or severity of losses,
- the likelihood of injury, failure,
- the combination of likelihood and loss,
- the probability that the actual loss value deviates from the expected values,
- the likely value of the loss incurred by the risk recipient by hazard scenario execution, expressed in monetary terms or other terms,
- the cumulative effect of the likelihood of uncertain events that may positively or negatively affect the objectives of the project,
- the volatility of financial variables (portfolio value, profit) around the expected value,
- the potential for gain or loss on investments or business (the speculative risk),
- the danger of negative deviations from the target (so called net exposure),
- the uncertainty associated with the development of asset value,
- the mean value of loss function,

The abovementioned selection of definitions is not comprehensive at all, but it is clear they have a certain common feature – risk is not a value leading to exact values but its value is an estimate, either empirical or analytical. Analytical estimate uses mathematical description of an event; we distinguish between a priori estimate (knowledge of the random behaviour of events as sources of danger from the past, an event is a priori known but its features are not) and a posteriori estimate (assumption that the event may occur, prediction of the complex event, future behaviour based on partial event behaviour). Empirical estimation is brought up if there is no ground for analytical estimate. Then it uses analysis based on experience. This type of estimate is also called a qualified estimate. When talking about company financial management, it is important to see its analytical meaning, i.e. it can be defined mathematically. This is the approach most often met with in literature and therefore we will use it when analysing risk. Just to make this approach even clearer, let us see some of other characteristics or definitions of risk:

“*Risk is such uncertainty, in which various, mostly mathematical and statistical methods enable us to quantify the likelihood of how much real conditions will diverse from estimate.*“ (Bringham – Ehrhard, 2010, p. 369)

“*Risk means various uncertainties that can be measured using statistical methods. Uncertainties are random phenomena that cannot be measured exactly, i.e. we can only make assumptions.*“ (Hertz, 1976, p. 95)

“*Risk is a type of uncertainty in which we do not know the future value of a variable but it is possible to assign - using standard statistical methods (objectively) or estimate (subjectively) - each possible state the likelihood of their occurrence. Therefore it is a quantifiable uncertainty, where quantification is based on probability distribution.*“ (Fotr, 1999, p. 207)

“*Risk is a potential financial loss of a body, i.e. not an existing realised or unrealised financial loss, but a future*

³ a man or a group (e.g. management or general meeting of shareholders)

loss arising from the financial or commodity instruments or financial or commodity portfolio.“ (Kao, 2000, p. 52)

“Risk is a danger of a damage or a loss and there is always a certain negative valuating associated with it. This meaning of risk is closely related to its identification with negative events likelihood.” (Jilek, 2000, p. 76)

“Risk is a term which defines how much uncertainty there is. The bigger uncertainty, the bigger risk. Risk is a degree of uncertainty.” (Fabozzi - Peterson, 2003, p. 401)

Diversity of risk definitions may evoke the fact that each author has a different concept. But it is just the opposite. In general all these definitions define risk as a variation from a desired or planned state. Some authors however see risk only as a negative variation while the other group see also a positive variation as risk.

Risk and uncertainty – While some definitions of risk focus only on a certain event likelihood of occurrence, the more complex ones do not operate with likelihood of occurrence only but also with the consequences of the event. Earthquake is an example of such event. The likelihood of its occurrence may be small, but the consequences in case it occurs would be so catastrophic that it is necessary to categorize it as a highly risky event.

Risk and threat – Some disciplines have different approach to risk and threat. Threat is defined as an unlikely event with widespread negative consequences, where analysts cannot determine the likelihood. On the other hand, risk is defined as a highly likely event, where analyses have sufficient information to determine its likelihood as well as consequences.

All outputs versus negative outputs – Some definitions of risk tend to focus on negative (undesired) scenarios, others are more extensive and include risk variability. In the field of industry risk is defined as a result of likelihood of an event that is considered negative and as a determination of an expected loss as a consequence of the event occurrence.

Risk is always associated with the following terms:

1. **uncertainty of outcome**, the bigger risk, the broader margin between possible results. When talking about risk, there are at least two meaningful and realistic alternatives of solution;
2. **undesirability**, which means that at least one of two results is undesirable for the company or it has a negative effect. If both results are desirable or have a positive effect, there is no risk in decision-making process.

Risk analysis brings some problems with terminology, which is often not uniform. This fact is caused by a wide range of meanings of the word risk, usage in different fields and ambiguity of some terms. Even standards dealing with risk management use different terminology. Even though regular communication among experts is not usually affected by this fact, there may be some problems when it comes to translation into different languages.

Risk factors that can influence a decision-making situation and which should be taken into account by managers in solving various decision-making processes include:

- The purchasing power of the population and the change of demand associated to it,

- changes in the prices of manufactured products,
- changes in input prices,
- changes in technology,
- failure rate and quality of production and inputs,
- employee morbidity and sick leave,
- changes in foreign exchange rates,
- changes in monetary policy and the associated changes in interest rates,
- changes in macroeconomic and national economic policy of the state,
- legislative changes,
- changes in international economic and political environment,
- weather influence, occurrence of illnesses,
- environmental disasters and accidents,
- etc.

3. Ways to reduce risk

Rational risk assessment as a relation between the potential benefits (effects) and losses is not the only criterion. Risk analysis should include lines of actions that would reduce modifiable risk factors but also eliminate (mitigate) its negative impacts. In general we know two kinds of approaches to protection against risk (Valach 2007):

- **Eliminate the causes of risk and thus eliminate risk** (e.g. to eliminate competition using economic or political power.) This way of protection against risk is also called *offensive approach to risk*. Complete elimination of risk is rather exceptional.
- **Reduce the adverse impact of risk to an acceptable level** (e.g. insurance, diversification, etc.). This approach is used more often than the first one. It is called *defensive approach to risk*.

Nowadays there is a wide range of tools, possibilities and procedures to reduce risk, mainly the following ones:

1. **Diversification** – Diversification means to diversify risk into more entities and thus to reduce risk in general. Investments get diversified if we put capital into more assets. Raising capital diversifies by spreading among several lenders. Purchase from multiple vendors means diversification. Production can diversify by producing several kinds of products in several regions. Sales are diversified by sales to multiple customers at home and abroad. There are several types of diversification:
 - *Vertical diversification* - production program has been extended by successive production stages; e.g. if the company produces a final product and purchases intermediate products or components, it may opt for its own production of these components. It reduces the dependence on suppliers.
 - *Horizontal diversification* – is in fact expansion of the production program of other products (services) of different nature. The horizontal diversification consists of two subspecies: a related diversification and diversification into unrelated areas. In a related diversification, production activities are expanded into an area linked to the

original one by a factor, for example a shared know-how. Diversification into unrelated areas, as the name reveals, has nothing to do with the original production activity of the company.

- *Geographical diversification* - a distribution of business in several countries. The country can be chosen on basis of several criteria, for example tax dumping, less expensive but skilled workforce, benevolent environmental policy, foreign investment support system and tax breaks, and so on.
- *Diversification in terms of suppliers* – company should strive to ensure material and energy inputs from multiple vendors, thereby reducing the risk of supply failure.
- *Diversification in terms of customers* - a sufficient number of customers ensures that insolvency or resentment of any of them does not significantly deteriorate the venture.
- *Diversification of investments*.

Depending on whether the hazards could be completely eliminated using an appropriate method we can distinguish between non-diversifiable risks (market, systematic) and diversifiable risks (non-systematic). Diversification can protect the business only against diversifiable - systematic risks.

2. **Contractually agreed measures** - in practice we may encounter several types of contractual arrangements. The most commonly used include:

- *Agreements on safeguards*. The guarantee may be property, movable property and assets of the debtor. The lender is thus protected against credit risk.
- *Provisions on the conditions enabling changes in interest rates by the creditor*. Such conditions tend to be included in credit agreements, if the loan was granted at a fixed interest rate. The lender is thus protected against the loss of interest in case the interest rate in the economy is growing.
- *The agreement between the exporter and the importer about the currency in which the delivery will be invoiced and paid*. If the exporter expects his currency to be weakened in relation to that of the importer, he will be interested in invoicing and payment in the currency of the country of the importer. It is because after the collection of payments in a stronger currency, once he exchanges the payment, he obtains more units in their (the weakening) currency. And vice versa - if the exporter assumes a strengthening of the domestic currency, he will be interested in invoicing and receiving payment in local currency. Thus if it is necessary, he will gain more currency units of the importing country for the domestic currency. Interests of the exporter and importer are contradictory on this issue. The currency they both agree on depends on the bargaining power of partners - it can be a completely different currency (third country).

- *The inclusion of a currency clause into payment obligation agreement*. The clause specifies how partners will participate in covering the difference resulting from change in the exchange rate between the time of the initial commitment and the time of payment. It is a part of the so-called agreement on security clauses.
 - *Barter agreement*. It represents a supply of goods for goods. It is a defence against not paying to customers and in case of the international exchange of goods defence against foreign exchange risk.
 - *For payments associated with the international movement of goods and services* it is possible to cover the exchange rate risk by increasing supply price, by demanding an advance payment from the customer, or demanding payment in advance. All these measures are disadvantageous for the consumer, and therefore reduce the competitive ability of the supplier. The agreement is only possible in low sales negotiation position.
 - *Factoring and forfaiting* means selling a short-term or a long-term debt to the factor (forfeiter), which then takes both the risk that a borrower defaults (*credit risk*) as well as any *foreign exchange risk*.
3. **Flexibility** - Adverse consequences from exposure to the market environment and the occurrence of certain risks can be reduced by flexibility of the investment project, which means the ability to respond quickly and without incurring excessive costs to various changes. A typical example is the choice of universal production equipment to ensure a wider range of production and the possibility of processing a wider range of raw materials. It is not appropriate to apply the concept of flexibility only to the manufacturing facility, but it needs to be applied in every activity of the company, for example the choice of financing the purchase of capital. Acceptance of flexibility as a tool for reducing the risk of investment projects is usable in their conception, in the variant project processing and compatibility between different variants, allowing for adverse conditions to move from one option to another option. Greater flexibility can be reached by:
- *production of a wider product range*, which allows a flexible respond to fluctuations in demand simply by changing the production schedule,
 - *ensuring versatility of the production facilities, and technologies*,
 - *leaner organizational structure*,
 - *processing a wider range of raw materials and semi-finished products, or by using several types of energy* (or drawing it from multiple vendors), which helps reduce the risk caused by unavailability.
4. **ALM - Asset Liability Management** - is a process of active management of the company balance sheet to create the optimal balance between expected revenues and expenses and related financial risks, i.e. the company is trying to mitigate the risks by time and material reconciling of their assets and liabilities, or cash inflows and outflows. ALM originated as a

management discipline around 1970. The base was to balance cash receipts and expenditures in the time frame so that the company would not become insolvent in any period of time. Gradually this principle developed in other areas:

- *Management of assets and liabilities as a tool to mitigate exchange rate risks* - comparing assets and liabilities as well as income and expenditure in foreign currencies in order to achieve a settlement of claims and liabilities of an entity in different currencies, and when they fall due. The company eliminates exchange rate risk. Natural hedging - a settlement of the total amount. It is important for the reconciliation of expenditure and income in another currency at a given company also to be achieved in the time distribution, which means in different periods of the year. Net exposure - predominance of expected expenditure over income is the amount that is exposed to exchange rate changes.
 - *Management of assets and liabilities as a tool to mitigate interest rate risk* - the comparison of interest-bearing assets and liabilities of the company in terms of their sensitivity to changes in market interest rates as a prerequisite for adopting measures to mitigate interest rate risk. If the financial market interest rates change, the amount of paid and collected interest on company payables and receivables, which were agreed with floating interest rates change as well. When market interest rates change, the market value of bonds forming part of the company financial investment change as well. The market value of bonds at interest rates falling grows and when interest rates grow, it decreases.
5. **Risk division** represents a means of reducing risk, where risk is distributed among two or several parties involved in the implementation of a business project or activity.
6. **Risk transfer** – means shifting risk to others. In any case, the entity assuming the risk requires some compensation, it is therefore necessary to assess the advantage of this approach properly. It may be carried out in the following ways:
- *entering into long-term purchase contracts* for the supply of raw materials and semi-finished goods under previously agreed conditions, for example at fixed prices,
 - *entering into contracts for the sale of products under predetermined conditions* applicable to e.g. sales volume (minimum volume production requirement),
 - *renting production facilities, or other means (leasing),*
 - *outsourcing* is the transfer of in-house activities generally unrelated to the main activity of the company to an external entity (such as a subcontractor). Outsourcing is therefore a special form of outsourcing of previously performed procedures, in which fixed length and activity is
- a subject to a contract. This makes outsourcing different from other "partnerships",
- *delaying deadlines for concluding contracts* for specific projects, usually of a technical nature (e.g. development of new products and technologies) until knowing the real costs,
 - *futures (hedging)*
7. **Insurance** - in the case the insurance company enters into a contract with an insurance company which undertakes to repay any damages clearly specified in the contract. In return, the company commits to regular payments, called the premium, which is included in the cost. In the past it was all about insurance against so-called net exposure, e.g. fire, flood, etc. Currently, there is an increasing trend of insurance against business risks such as investments abroad and so on. Insurance is generally characterized as the creation of a centralized monetary insurance fund by contributions of insured entities at risk. However, a company must consider the financial relationship between the amount of premiums paid and the likelihood of an insured event before contracting insurance. But only "insurable risks" can be insured, which means risks that meet the following criteria:
- *large scale criterion* - large number of entities exposed to risk,
 - *the feasibility of risk criterion* - the risks must be relatively independent, must not be significantly positively correlated (feasibility of risk must not occur simultaneously in all insured entities),
 - *quantification criterion* - this means in practice that commercial insurance company must be able to quantify the losses incurred by the insured event,
 - *economic risk acceptance criterion* - commercial insurance companies only insure those risks that are across the board and staggered. The insurance company is thus able to achieve economic equilibrium of the insurance,
 - *criterion of randomness of risk* - that is, there must not be 100% probability of occurrence of an insured event.
8. **Avoiding risk** - risk avoidance tactics should be applied very cautiously. This approach is justified in unacceptable risk when the business projects failure could result in significant distortions of the financial stability of the company, and eventually lead to the decline of the company. Inadequately assessed risk solution is gambling. But even excessive risk avoidance can lead to serious financial problems. Entrepreneurship is not possible without accepting risk - if the entrepreneur avoids the risk too much, more aggressive competitors would push him out of the market. We always have to consider which risks can be avoided without major threats to the expected result. Knowing what specific risks is the plan exposed to can help avoid certain risks. If, for example, we find out that some of our customers risk bankruptcy, we stop deliver him and thus avoid a bad debt - we avoid the risk of non-payment, etc. Avoiding risk may be done in a number of ways:

- *to withdraw existing markets* by divestiture, liquidation, product group spin-off or business unit of the parent company spin off,
 - *to ban high-risk activities and transactions* by adopting a system of limits on acceptable risk,
 - *to stop specific activities with unacceptable risk* by changing plans, objectives or moving funds,
 - *to avoid risky activities* not related to the development of the company in accordance with the approved strategy,
 - *to prevent capital and investment projects* with high risk and low return,
 - *to eliminate the identified hazards* by designing and implementation of internal preventive processes.
9. **The use of force** - procedures by which the company forms a competitive environment in an effort to gain a dominant position, that means the company will focus on the removal or elimination of risk through the use of power, dominance or competitive advantages of the company. Lobbying can also be put to this category.
 10. **Obtaining additional information** - a different kind of market and marketing analysis before introducing new products to the market, gathering information about competitors. This effort may lead to delays in business decisions, which can have a negative impact.
 11. **Self-insurance** - a policy of an undergone risk self-insurance may be done in the company through the reserve to cover losses incurred. According to standard accounting procedures reserves for anticipated risks and losses are based on the precautionary principle. In particular, the cost of demolition, remediation work, compensation, fines and penalties, obligations under the guarantee liability, litigation and such. It is therefore clear that reserves are potential liabilities of uncertain amount and indeterminate duration. They can include interest-bearing and non-interest-bearing liabilities, short and long term. The correct procedure would therefore be the assignment of liability provisions in the category which would reflect their commitment. Lack of this particular form is that generally the entity is unable to establish reserve funds in the amount that would cover a greater financial loss. In addition, there is a problem, in what form financial reserves should be maintained to bring a reasonable return, but at the same time, be readily available if necessary.

4. Conclusion

Entrepreneurs may avoid risk mostly if they review profitability and riskiness of all project variants in form of financial plan well in advance. It is a task of a manager to choose the best variant. Basic criteria for that are: profitability (cash benefits promised by the investment) and riskiness (likelihood of project failure), which are proportional. Each company has its own approach to risk. This approach can be represented by so called indifference curve, which depicts the relationship between a risk rate and a required yield rate. Basic yield rate represents no risk

investment. All points on the indifference curve are equally acceptable for the company. Desirable variants lay above the indifference curve, undesirable ones under the indifference curve. Apart from negative aspects of risky choice alternatives there is also a positive aspect. If the choice of an alternative is connected to some danger of not fulfilling target value of a criterion, then there is generally also a possibility of exceeding this value that means some hope to get a higher effect that a planned one was (possibility of a positive variation). It is typical for risk decision-making that low risk alternatives have a very little hope to exceed desired effects, while higher risk alternatives are "much more hopeful" in terms of achieving higher effects that the planned ones are. Therefore this fact brings some dilemmas into risk alternatives evaluation.

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