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Reflections on the interpretation of uncertainty and risk based on the example of PPP scheme

There is not one single sector of the world economy and not one geographical region of the world that has remained unaffected by the global financial collapse that took place in the recent past and the long-term crises which it triggered. We can only speculate today how this crisis is likely to provoke changes in economics, a branch of science most directly affected by the above processes. From the very beginning of its existence, economics – unlike other disciplines – strives for objectivity while allowing a variety of ideas to surface and clash. Although both diversity and dynamism are coded on micro- and macro-levels in economic theory, a feature that enables researchers to choose from among different building blocks in order to lay the foundations of their theories, the economic policy of developed countries as well as the business policies of enterprises are usually based on the principles of the very same mainstream trend. Many already hold the view that some basic premises of the mainstream concept have already been disproved by experience. Certain emphases and research directions – if not the basics – are quite certainly going to be influenced both by the events of the world economic crisis and also by its known or estimated consequences.

It seems necessary to offer a new interpretation for the concepts of uncertainty and risk, whereas their weight among the content elements also needs changing. It is clearly proven by the experience of the recent past and the present that various dimensions that have often been neglected in theories dealing with risks representing different levels as well as various factors so far treated as residual elements may in the future play a role of key importance with a dramatic impact on actual economic processes. This anomaly is even more relevant to business calculations. Let me refer to the question as to how much weight a possible international financial disaster or a possible state bankruptcy had in the business calculations of a European or an American business enterprise as recently as two years ago, and how much they weigh today.

The present study is designed to analyse what techniques are applied by the business and public sectors to manage risks and how they are associated with the known interpretations of uncertainty and risk. The best possible example to illustrate the present practice is to analyse the risk management of PPP schemes, schemes that are based on a partnership agreement between the private and public sectors, because by using this particular example the attitudes of both the business and public sectors can be analysed at the same time and also because in this particular scheme risk-sharing clearly plays a key role. The example used in this study is the risk matrix recently applied in a higher education project offering a case of flawed risk interpretation and its consequent potential losses.

UNCERTAINTY AND RISK

The theoretical importance of distinction

In everyday speech the terms risky and uncertain are often used as synonyms, both of them often applied as adjectives with a negative connotation. The best we can expect is a slight distinction of degree in which the notion of danger is even stronger when the term risky situation is used. In economic science and especially in business thinking the concept of risk may involve not only the prospect of a loss but also the prospect of a large profit, whereas the concept of uncertainty seems to indicate problems associated with business foresight.

So the first step of clarifying terminology is to define certainty.

"We speak of certainty if expectations lead to the assumption of one single occurrence. In such a case, decision-makers can describe the expected future profit by using one single value rather than by offering a series of alternative outcomes." (Bélyácz, 2001, page 92)

Based on the above definition, a risky or uncertain situation means that the possible outcomes can only be established with some degree of certainty. As business decisions belong to this domain, risk and uncertainty represent regular components of the business, however, there are quite diverse views as to distinguish between the two. These views are summarised in the following.

❶ According to traditional definition, the distinction lies in the fact that a risk can be established on the basis of objective probability distribution, because it rests on the formerly observed outcomes of recurrent events in the past, as well as on statistical data. Uncertainty can also be approached based on the probability of occurrences, however, the results are concluded from subjective estimates without an empirical database behind them.

Probabilities are categorised into a priori, statistical and estimated probabilities, whereas a risk is basically a type of uncertainty which we can measure, while all other types of uncertainty are only estimated. This school of thought is associated with the trend-setting work of *Knight* (Knight, 1921) whose concept played a dominant influence on *Van Horne's* investment theory,[1] on *Hicks* profit concept[2] or on *Stigler's* economic interpretation of information.[3] The advocates of Keynesian economics also use the above concept as a point of departure for their interpretation of risk.

❷ The proponents of the modern technicist thinking believe that risk can be calculated, hence an optimal risk allocation is possible. They hold the view that risk equals to the probability that a certain unfavourable event will take place within a given timeframe or as a result of certain challenges. In other words, in business calculations risk is manageable, risk is to be managed. According to the interpretations of *W. Sharpe*[4] and *J. Lintner*[5], business actors can freely choose from among any combination of risky and risk-free investments. In this context, we speak of uncertainty if the probability of its occurrence is unknown, consequently, it is inevitably ignored in economic analyses.[6] It goes without saying that this approach to risk is particularly favourable for construing mathematical models.

❸ The third alternative interpretation which also serves the purpose of eliminating flaws of the previous two approaches may be if we define risk as the chance of detrimental outcomes, while we speak of uncertainty if there is a number of possible outcomes, regardless of the fact whether such outcomes are assessed as favourable or unfavourable ones. (Bélyácz, 2001, page 93)

❹ Keynes's concept of this subject is very close to the classical interpretation of Knight. The reason why we find it desirable to mention the two separately is Keynes's emphasis which

differs from that of the original concept. In his best-known treatise on this subject[7] Keynes makes no differentiation in content between what is known and what is probable, because in his view uncertainty represents a category of differentiation only if such a situation arises from the lack of knowledge. In this concept something is uncertain if it is unpredictable, unique and unprecedented; a truly uncertain situation not only means that the probabilities of outcomes are immeasurable and unpredictable, but it also means that the alternatives of outcomes are unknown.[8]

5 The post-modern interpretation of risk is associated with the world famous sociologists, such as *Beck[9]* and *Giddens[10]*, who introduced the notion of risk society. They are of the view that the traditional concepts of risk are no longer capable of managing the new types of risks emerging as a result of modernisation. Compared to the risks characterising the industrial societies in the past, the new risks can be described with the following features: they are less limited to time and space, so they can transgress geographical or generational borders, they are of macro-economic or global character and quite often they are linear consequences of an earlier decision, they can cause enormous damage, and therefore they cannot be compensated by a risk mark-up and cannot be covered by private insurance. Uncertainties of this type, which cannot be calculated, can no longer be handled by using the methods of the past. Sociologists include in this list of risks nuclear disasters or pandemics as well as a global financial collapse. These are the new types of risks that cannot be handled in a traditional way, the traditional mechanisms of central state decision-making are inadequate. The only solution is to involve the largest possible group of citizens in the individual phases of decision-making. Apart from high-risk projects, the above risk interpretation does not explain what the most appropriate procedure should be in

the case of – let us say – a state investment designed to implement a medium-term traditional public service project, such as a school or a hospital.

6 The subjectivist school of thought represents a new approach in risk concept, it uses both the theory and the empirical results of cognitive psychology together with traditional decision theories. Concerning the problem area of the risk of uncertainty, the above approach emphasises the recognition of the risk of the decision-maker as well as his attitude towards the risk. The most renowned economists representing this approach are co-authors *Kahneman[11]* and *Tversky*, who are best known for the renewal of decision theory, and whose basic premises appeared earlier in the works of *Ramsey, Fisher* and *Good[12]*. They offer an interpretation of risk with a psychological and sociological background, in which the degree of risk is influenced by the available information and decision-making experience as well as by a number of additional subjective factors, such as the cultural background, the assessment of the decision's magnitude, the self-assessment of the individual and his possible false illusions about his knowledge, etc.[13]

7 Froud refers to the approach of post-Keynesians as a radical risk management concept, they reintroduced the category of uncertainty along with risk already in medium-term analyses. Among these economists, *Davidson[14]* and *Kaldor* focused on this subject area. They accepted the Keynesian concept that decisions are not necessarily supported by weighted profits multiplied by probability estimates, but they are sometimes instinctive choices. The traditional risk calculations may prove especially insufficient in the state of political and economic instability, but they are just as inadequate when individual or rare decisions are taken and when decisions lead to system changes, to scale effects or when the effects of decisions are felt after a longer period of time.

The growing dynamism of economy and the society gradually undermines the relevance of traditional calculations. This also means that it is possible to intervene, in other words, new prospects open up when good decisions push the economy into a favourable direction.

❽ In the century-long debate of scientific theory on risk and uncertainty there is a new school of thought surfacing according to which risk is a value drive rather than something that decreases value as presumed earlier. The changing of the negative sign to a positive one in the interpretation is based on an option assessment model which indicates that the greater the uncertainty the higher asset value can be realised, in other words, the margin of a possible future value becomes wider. This school links uncertainty to time and leads to the conclusion that *"with the passing of time new information and the adjustment capability of decision-makers can enhance the growth potential of a given company and reduce the losses."* (Bélyácz, 2004) Risk becomes something like a new playground and thus a potential source of additional profits rather than a negative condition which is to be counterbalanced by risk premium or whose impact is to be accounted for in calculating future yields by increasing the denominator of the discount factor.

This is not the end of the list, it is quite conceivable that, as a result of the recent events of the world economy, the concepts of uncertainty and risk will soon be approached in the economic science with further refined definitions.

The theoretical basis is considered of great importance, because this is what the adequate practice of risk management and the methods to be applied derive from. Assuming a case of conventional risk management or a case of an uncertain situation of decision-making which is based on the third type of interpretation, it is sufficient to adjust the expected net yields by using estimated probabilities of occurrence in order to find an optimum choice among the available investment alternatives. Nevertheless, the actually realised yields and expenditures may significantly deviate from the estimates. If we use the Keynesian concept as a point of departure and accept the arguments of his followers, the given problems can be remedied by increasing the level of information or by delaying decisions that carry a large degree of uncertainty, because uncertainty is linked to time and to the decision-makers' lack of information.

The sociological or psychological approach to risk and uncertainty introduces new factors in risk interpretation, factors whose application in business calculations is practically impossible. On project level, it is impossible to handle the risk of events whose occurrence carries a very low probability, events which are associated with landslide disasters in the world economy, in society or in the environment, etc. Even an individual state on its own may not be able to handle such a risk. The prospect of such events actually taking place and the chances of a carry-over effect have recently grown so much that risks associated with them can no longer be neglected. The psychological approach involves – for other reasons – an impossible difficulty for risk management in the domain of business calculations, because the variants that define the degree of risk are lowered to the level of individuals.

If we use the mission statements and particular features of business enterprises and public institutions as a starting point, it is sensible to assume that business organisations will use the second or possibly the third interpretation of risk as a basis of their calculations, while public institutions will find them insufficient, because they are also obliged to take into account macro effects – including effects outside the economy – which are indicated by concepts listed under points five and seven. The concept mentioned lastly is more relevant for business decisions, since it relies on factors such as the following: a large degree of adjustment capabil-

ity and flexibility among decision-makers, their aspiration to broaden the available information, a low level of aversion towards risks, etc. These factors are not characteristic of the public sector. (Stiglitz, 2000, p. 204) Nevertheless, the application of the above interpretation cannot be general even in the business sector, because in the case of urgent or irreversible decisions, the risk does not carry a self-correctional impact, and the losses arising from the lack of information remain part of the project.

Business risk management

Business risk management is a central question of professional business literature. It is a well-known fact that the systematic and non-systematic components of corporate risks require different handling. While the latter one can be reduced close to zero by diversification, the continuous management of systematic risks is a key element of business operations.

Business risks fall into the following categories[15]: interest rate risks, purchasing power risks, market and marketability risks, management risks and bankruptcy risks and other unspecified risks.

Understandably, it depends on the individual enterprise or project what weight the above risk categories have within the total risk. Similarly, the part of the risk that can be diversified – the so-called individual risk – also depends on the individual enterprise or project. In a well-functioning and extensive capital market practically only systematic market risks represent a source of danger for the investors who concentrate on the covariant of the different investments while diversifying their portfolios. Diversification is less feasible on corporate level – it would not be appreciated by the capital market – consequently, in such cases both individual and market risks need to be managed in an intensive and efficient way. This difficulty is somewhat com-

pensated by the fact that while an individual investor can protect himself by using a broad portfolio, an enterprise has at his disposal a number of means to handle individual risks – or at least risks linked to a project.

The time interval of business decisions vary although most decisions are relevant only for a short period of time. The businesslike economic activity of enterprises usually contains identical or very similar transactions which, due to specialisation, recur one after the other and which are carried out mostly within a short time interval. Business organisations usually have a relatively permanent list of market partners. In the case of such business deals, individual risk can be held at a relatively low level due to routine, specialisation and a considerably lower cost value, the risks of such business deals are also well-manageable. Business organisations, however, are regularly confronted with individual decisions which represent unusually large values, decisions that go beyond routine and which have a defining significance for a long period of time. Typical examples of such decisions are major investments and acquisitions in which the following factors play an especially important role: assessing and evaluating the risks, determining potential outputs and associated probabilities of occurrence as well as considering other business consequences.

When business organisations identify risks related to serious, non-routine decisions, they usually endeavour to form a complex picture, however, risks do not influence their decisions in the same degree. In such cases, project risks are generally decisive, while macro impacts are regularly negligible. Enterprises do not have much chance to exert an influence on macro-economic risks, from corporate point of view, they are considered fully external impacts. Macro-economic risks, however, may be included in calculations, although they seldom have an influence on choosing between invest-

ment alternatives, because such risks have an equal effect both on investment alternatives as well as on each of the competitors. Inflation is regarded as a risk of such type, as the future changes in inflations can only be estimated. Some companies may find it insufficient to limit their calculations to nominal net present values (NPVs) and may want to include an inflation rate or inflation rates in their calculations, thus counting the real value for both the yields and financing costs. (Hutchinson 1995, p. 157) Macro risks play a more significant role in multinational companies, because when they select, for example, the site of an establishment they are expected to compare the potential national economies and legal systems.

We should also mention the notion of sectoral risk which equally applies to each and every enterprise in a given sector, consequently, it is quite usual to take sectoral β also into account. Admittedly, however, in the assessment of investment risks, corporate size and category – micro, small, medium, large and multinational companies – are usually more relevant than the sector they belong to.

Individual corporate risks play a bigger role in investment decisions, because such risks are influenced by certain specific features of the enterprise, such as the quality of management, the technology applied as well as its strengths and weaknesses. Similarly to project risks, corporate risks are also viewed with a critical eye by creditors and investors who also do their best to reduce such risks by using their own means and methods.

In the case of investment decisions, the project's own risk is an additional component of total risks. Most often a given investment will suitably fit into the company as a whole, consequently, the β of the investment more or less equals to the β of the company. The project's own risk represents the risk which only occurs if the project itself is the enterprise. This risk is

naturally going to be in the focus of the business organisation in its investment decision.

In order to quantify the risks described above, the following indicators are used: the square deviation or variance, standard deviation, band of dispersion, average absolute deviation, semi-variance or relative variance. Despite the availability of a number of indicators, they are still not always sufficient to measure risks with great certainty. The relative risks associated with the compared alternatives are relatively easy to define. In addition, companies usually set certain limit values for the indicators in order to screen the prospective projects. In the course of screening the alternative options, some additional parameters, which are somewhat more difficult to quantify, are also taken into account, such as the macroeconomic exposure of the investment, i.e. how far the success of the project is dependent on macro trends, the option of abandoning the project or the combination of fixed and variable costs relating to estimated yields, i.e. the magnitude of the gearing of the working capital.[16] A similarly critical point is the project's financing method, because the tax advantage offered by the credit financing interest is not necessarily sufficient to compensate the risk of bankruptcy that may arise for the very same reason. As a result, the actual outcome of the project depends on possible future changes in the tax regime, in interest rates, in exchange rate risks for foreign currency credits and in bankruptcy law. The reason that financial leverage does not make efficiency calculations excessively complicated is explained by the fact that it has an equal influence on possible investment alternatives which makes it negligible in the selection process.

Business decisions related to risky investments are naturally also influenced by the attitude of the decision-maker towards risks. Depending on whether the decision-maker is risk averse, risk indifferent or perhaps risk-

seeking, the risk premium expected by him will be quite different, and the return-utility function of the possible investment alternative, which serves as a basis of his decisions, will also vary. (Bélyácz, 2001, page 247)

When corporate managers assess the risks they can use a great variety of methods to evaluate, for instance, the potential investment alternatives. A recent survey, which reviewed the most favoured methods to be used among British, American, Canadian and Australian managers, came to the following conclusions. Most managers used a sensitivity test and either increased the expected rate of return or shortened the time period of return, they also used the tools of modifying future cash flows, and often drew up several scenarios in which they compared the optimistic and pessimistic scenarios to establish the degree of risk. In addition to the above, unspecified non-quantitative assessments were also applied.[17] Quite a few managers chose to use the capital asset pricing model which classifies projects, depending on their features, into three or four categories according to the expected yields. Consequently, the discounted interest rate (r) is expressed as follows:

$$r = r_f + \beta * (r_m - r_f),$$

where

$r_f =$ risk-free rate indicates the expected yield of safe investments,

$\beta =$ indicates the project's own expected yield (which can vary from project to project), and

$r_m =$ return on the market portfolio indicates the financing costs of the company as a whole. (Brealey – Myers, 1999, page 195) Various solutions are available for managing – decreasing, sharing, shifting – the calculated and specified risks: insurance, securities and leasing transactions, contractual arrangements for risk-sharing between partners and other solutions are widely used by enterprises.

In summary of this chapter, it can be stated that business risk management has great traditions both in theory and in its methodology, and the risk management tools are well-known and widely applied by managers.

RISK MANAGEMENT OF PPP PROJECTS

About the scheme in brief

Public-private partnership is not a new development, if we look at it in a broad sense it has existed throughout human history so it is evident that the modern state and the business sector are also linked together is a number of ways. Outsourcing is one of the globally established means of co-operation in which a public institution, while preserving its basic functions, outsources certain complementary activities to the economic actors of the private sector. The voucher system also represents a certain type of co-operation in which the state finances certain services, which are fundamentally public in nature, while users of those services can choose the service provider most suitable for them. The so-called user charging system, which is limited to financial co-operation, is also functioning today in a number of areas. Concession contracts, which have a century-old history in Hungary and played a role especially in establishing and operating transport infrastructure, is widely regarded as the direct predecessor of PPP, which is the main subject of this study. The common elements in these various modes of co-operation are the following: the business sector is gaining ground in areas which previously were dominantly state-controlled activities; however, the state does not withdraw from the provision of such services entirely, i.e. there is no complete privatisation as organising and operating such services – or at least their financing – remains partly a state task.[18]

Public-private partnership as a new type of co-operation between the public and private sectors represents a step closer to privatisation even though the conclusion of the contract does not mean a final transfer of assets. PPP transactions can be described as *"a long-term, contractually regulated cooperation between public authorities and the private sector to carry out public assignments, in which the requisite resources are placed under joint management and project risks are apportioned appropriately on the basis of the risk management skills of the project partners"* (2006/2043 EP resolution).

The above definition contains the important distinctive features of this scheme, such as "long-term" which usually means 15–20 years but can represent an even longer period of time depending on the character of the project.[19] Another important feature is that co-operation is maintained throughout the carrying out of public assignments, i.e. the final transfer of the service is not an objective. A project firm may also be set up to coordinate interests and objectives. Another important feature is risk-sharing between the partners in a way which is designed to make risk-taking and payment of fees proportional and predictable.

The basic model derives from the United Kingdom where the Tory government, in 1992, legislated the Private Finance Initiative law which provided a legal framework for such co-operations and launched the fast spread of PPP in English-speaking countries and later all over the world. Today, this scheme is applied in a great variety of areas, and following the initial schemes in transport, health and educational infrastructures, at present, it covers the full scale of public services, including government institutions and even penitentiary establishments. In the different models of co-operation we can find a mixture of the following basic components: *Design-Build-Develop-Finance-Operate-Transfer.*[20] Accordingly, there are a number of varieties for different types of co-

operation, DBFO being the most common in Hungary. In a typical contract the central authorities assign private sector actors to design and build an infrastructure suitable for providing public service. When the service is put into use the operating function will be the task of the business organisation according to the criteria specified by the assigning state authority. Projects are often financed by the private sector with state guarantees and to compensate private financing the state authorities are charged a fee which is significantly higher than the costs during the decades of operation. The contracts are very seldom limited to two partners only, because in addition to the contactor and operator, on the one hand, and the state institution fulfilling public duties, on the other, other partners – such as the supervisory body of the state institution, the capital investor, the financier, the project firm as well as the treasury asset management company – may also be contracting parties.

Anticipated profits and risks

A co-operation which is duly prepared and properly completed offers the parties obvious advantages. One of the most important advantages is perhaps that in this scheme the contracting public institutions are compelled to pursue a businesslike thinking, whereas the private sector can benefit from business ventures representing significant values. As a result of this scheme, there is no need to burden the central budget, so the necessary establishments can be built without further increasing budgetary deficit. These establishments will serve the public and the burden of its cost will be borne by the central budget, i.e. by taxpayers in a considerably long period of time and at a relatively even rate. The total budgetary cost will amount, in nominal value, to several times of the cost value of the investment, but bearing the costs

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starts jointly with the commencement of operation, consequently, there is no need for a large initial capital expenditure which is characteristic of traditional state investments.

Quantifying risks based on a risk matrix plays an outstanding role in calculating settlements among the partners. In this sense, PPP does not really differ from any other type of business co-operation as economic rationality always demands that the parties should clarify the risks involved in implementation. Risk aversion, an attitude regarded as a most common one, means that economic actors endeavour to manage the assessed risks by reducing or shifting it as well as by charging a risk premium.

The techniques applied in risk-sharing may also contain some hazards as calculations relating to the efficiency of investment may be seriously distorted by a risk matrix which is misinterpreted, incorrectly assessed or deliberately manipulated. In this case, PPP represents an option which seems more favourable than it in reality is, a phenomenon which is cited by *Shaoul* among others. (Shaoul, 2005, p. 453) Another common mistake is when certain risk elements are included in the calculation in an ad hoc manner. A similar mistake is when the contract contains the shift of a risk which finally must be accepted by the state, because – for instance – the service provision obligation for the public is based on constitutional law.

The prerequisite of a PPP contract, which is successful and beneficial for all, is very thorough preparatory work as only reliable and extensive information can compensate the particular feature of the scheme that due to the tendering process, parties, who have not met before, make commitment for a long-term relationship without a trial period, i.e. there is a lack of trust (Baretta -Ruggiero, 2008). It is a part of this preparatory work that the partners clarify the risks of the project and the scheme as well as the uncertainty factors present in the calculations and make an effort to reduce them.

By studying the literature dealing with the risk management problems of PPP/PFI contracts, it seems that there are more serious interpretation anomalies than the problems tackled so far, as risk, uncertainty and the unknown are conceptually overlapping in the case of the projects (Froud, 2003, p. 569). Without clarifying the concepts and without laying down the theoretical bases, there is no chance for efficient risk management. The next chapter enumerates the risks of PPP projects mainly from the public sector perspective.

PPP risks

The PPP scheme naturally represents business from the perspective of the private sector, so its risks can be interpreted and managed by the established means and methods. The considerations related to calculations are simple, they are basically governed by the enterprise's interest to generate profit, and all other tactical or strategic objectives – accession of property, market seeking, long-term competitive advantage, good corporate image, etc. – can be linked to that fundamental interest. The public partnership itself carries hardly any additional risk for the business organisation, while it offers considerable advantages. Such advantages include, for example, the negligible chance for the public partner's bankruptcy, advantages deriving from receiving state references, a business deal bigger than usual, the public partner's weak ability to enforce interests, including all weaknesses of the red tape that can be exploited.

Business risk management is a concept alien to public institutions, the profit is missing from the institution's set of objectives. Instead, complex objective functions, which cannot be concentrated into one single indicator, are determined, and risks are not limited to businesslike items, since the state stands behind the institutions with its unrestricted economic and

social responsibilities. For this very reason, the justification of using the NPV can be questioned. For the primary task of public institutions and governments would be the provision of the possible highest quality service for the citizens rather than the maximisation of the asset value or the favourable figure of the balance sheet total (Shaoul, 2005, pp. 448–451).

Despite all what has been described above, business risk management is pursued in the PPP scheme even if with several weaknesses.

Froud proves that when public sector investments are analysed a technicist risk management is suggested by public institutions providing the guiding theoretical principles. Only the outcomes in which the probabilities of occurrence can be assessed are included in the calculations. This approach can be seen in the guidelines – including the Green Papers considered as standard works – issued by the UK Treasury and Department for Trade and Industry which manage the British PFI projects. Although the definitions of risk and uncertainty do not appear in the guideline, based on what is presented in it, risk is viewed as a chance for things to turn out for the worse, and when risks are then quantified in the course of a project, there is a need for risk-sharing among partners. The essential elements of the procedure suggested by the guideline is that the risk expressed in pecuniary value should in part be transferred to the private partner, a risk which the public institution is expected to compensate by a proportionate rise of the fee in the contract. This is the logic behind the public institution's decisions to purchase a service with a higher price. *"An efficient risk allocation is realised when it is transferred to a partner that is capable of managing it at a lower cost."* (Treasury Taskforce, 1997, p. 9)

Risk management has an outstanding importance for PPPs for two reasons:

[1] Project classification is itself subject to risk-sharing. In 2004, Eurostat specified the principal rules for the settlement of PPP projects, saying:" An asset built within the framework of a PPP project is treated as an asset outside the government sector, which makes it an off-balance sheet item if it meets the following two criteria.

▸ The *construction risk* is assumed by the private company.

▸ The *availability risk* as well as at least one element of the demand risks are also assumed by the private company. Consequently, if the construction risk is transferred to the state and the private company's obligation is limited to the acceptance of the construction risk, the asset is treated as a government asset. In such a case, the cost value of the asset will have a negative impact on the two indicators specified in the Maastricht criteria: it will have a detrimental effect on the budgetary balance and will increase national debt (it is qualified as a credit received from a private company)." (Karakas, 2004, p. 57)

[2] The second reason that makes risk-sharing so important is the following: it is the risk premium that helps meet the principle of Value for Money, i.e. this is what justifies the decision that a project is implemented within a PPP scheme as it is described in the equation presented below.

There were changing practices in Hungary concerning the calculation of risk management until 2005, when the equation used for the method to be mandatorily applied was regulated in a Government Decree, defining the calculations relating to net present value (NPV – NJÉ in Hungarian), and thus adjusting the Hungarian practice to the British standard. The mandatory equation is the following:

$$NJÉ = \left| \sum_{i=O}^{n} \frac{Bi - (KPi + KNPi)}{(1 + ri)^i} \right|$$

"where all expenditure and revenue values are without VAT, and:

$NJÉ$ = the Hungarian abbreviation of net present value, NPV;

$i:$ = the time calculated from the date of evaluation expressed in year (it may also be the fraction of a year);

B_i = direct and assured revenue, both in its amount and in terms of the probability of occurrence (e.g. revenue from the sale of a concession right; revenue from the sale of a piece of land required for the construction of a real estate, rental charges, etc.), revenue which is known at the time of preparing the evaluation of a given project, which is realised by the purchaser of a service/investment in connection with the project;

K_{Pi} = all expenditures incurring in each year 'i', to be borne by the state or by the purchaser of a service/investment in connection with the given project, in particular,

– service fee payable;
– direct state subsidy provided in connection with the project;
– interest subsidy related to loans on preferential term;

K_{NPi} = all expenditures and losses of profit incurring in each year 'i', to be borne by the state or by the purchaser of a service/investment in connection with the given project, in particular,

– the value of the assets transferred to the project;
– loss arising from the a failed utilisation of the asset transferred to the project (e.g. rental fee);
– public tax concessions (e.g. taxes, contributions, duties, etc.) ;

n = expiry of the contract calculated from the date of the evaluation;

r_i = discounted rate to be applied for the year 'i', whose value is to be defined based on the yield curve specified under paragraph (2)."[21]

The mandatory equation essentially means that a discounted cash flow is estimated for the total term of the project with the conditions of a future PPP contract and with the conditions of an alternative option: that of an exclusively public investment; the latter one is known as the public sector comparator (PSC).

In addition to the well-known shortcomings of the NPV method – such as problems related to yield estimates and to interest rate calculations – the use of PSC is also the subject of critical comments, as it is indeed not a good benchmark for the simple reason that it is not a real alternative. In the majority of the projects the feasibility of a project financed exclusively by state resources is simply not an option due to the shortage of state resources. (Ismael – Pendlebury, 2006, p. 381)

The calculation of applicable interest rates – which in Hungary are required to gradually decrease until the end of the project term – is not available, consequently, it is not clear what elements they are made up of, whereas it would be very important to be aware of them especially because it is interest rates that usually generate repayment levels which in nominal value amount to 2.8–3.5 times the cost value, a phenomenon quite characteristic of Hungarian PPPs .

On top of that, PPP represents certain additional risks for public institutions in addition to the usual ones. Long-term partnership goes with mutual interdependence and the project will contain all risks of the business organisation regardless whether they are specified or not. A partnership agreement views the state institution as equal to the private partner, namely, deprives it from the advantages a non-business actor usually enjoys without compensating it for the weaknesses it has in its role of functioning as a business actor. As a general rule, the rights and obligations of public institutions are regulated by the establishment via the legal system, as a result, the relevant legal regulations can be changed to serve the interest of the state – and in ideal cases – in the interest

of the public to be served. PPP-contracts compel the state to act within the legal framework of private law, despite the fact that it is the business partner that is under the pressure of contractual security. Preparing, monitoring and possible modifying contracts with a term of several decades usually involve considerable costs, and while the practice of business contracts is an integral part of the operation of business organisations, this is somewhat alien territory for public institutions when private interests have a preference over public interests.

A partnership based on business principles creates uneven positions for the participants from a number of other aspects as follows.

1 While a business organisation's responsibility extends to civil liability involving its assets, this financial limitation is non-existent in the public sector.

2 A business organisation is accountable vis-a-vis the owners only if its operation serves the expected profits provided it abides by the law. A public institution is expected to pay attention to economic, social and welfare, etc. consequences and is accountable for adverse results of any type.

3 In most services provided under a partnership agreement, the state authority is compelled to continue its duties even if financial considerations would dictate otherwise, whereas private organisations are entitled to withdraw.

4 Quite frequently, a public institution practically does not have any other realistic chance of implementing a project, and due to the unfavourable positions of the state, this is the only form it can choose.

5 The management of a public institution and even its internal and external advisors do not necessarily have the required business expertise.

6 In the bureaucratic maze of public investments the risk of corruption, abuses and individual interests is always present – something that is a natural risk in exclusively public investments as well – and such weaknesses may very well be exploited by business partners.

7 The acceptance of a long-term contract which runs for decades involves disadvantages for a public institution as a principal, a partner which assumes such commitments. For the private agent a long-term contract represents contractual security it can rely on in its business.

8 The system of PPP contracts is complicated, its preparation and administration take a long time and considerable expenses, most of which are covered by the public sector.

9 The position of the public institution as a principal is usually frozen at the time of commencement of the contract, whereas a business organisation will be able in later stages of the project to successfully utilise technological and technical developments still unknown when the contract was signed.

10 The state, conscious of the fact that in theory it could finance the project under more favourable conditions, still shifts the task of financing to the business sector. Excluding extreme cases, the state is a better debtor and its debts carry lower costs than that of a private organisation. In this situation, the financing risks of the business partner represents an additional burden for the partnership.

11 The withdrawal of a public institution from a PPP contract is quite burdensome, especially if it wants to guarantee the service, because the service provision is then out of its control to a considerable extent, and because irreversible transformations may take place. For this very reason, the public institution may find itself stuck in the contract even though it has proved to be disadvantageous for it.

12 Business organisations are usually precisely aware of their risks, concluding business contracts is a daily routine for them, a strength that is successfully emphasised in their PPP

contracts. A public institution, however, is not necessarily aware of these aspects either from its own point of view or from that of its business partner.

13 The term of public contracts may stretch so long that the very relevance of the assignment may become questionable, consequently, the partnership form itself may become irrelevant throughout the decades.

14 Public sector decision-makers – unlike the owners of a business organisation – have a mandate limited in time. This limited mandate is an incentive to encourage short-term results brushing long-term consequences aside.

15 The reaction time of a public institution is several times longer than that of a business organisation since most modifications have to go through long, complicated public administration procedures, making the two partners' status also uneven.

The list of the above points can go on, but despite all arguments listed, we can formulate a simple counterargument saying: if the state were not willing to assume civil law obligations and instead, it were to implement the project "out of force", it would certainly fail to find a private partner, or alternatively, it would have to include the price of uncertainty in the private partner's fee, a step that would make the accomplishment of projects excessively difficult. There is no doubt, the state is in great need of the business sector's capital potentials. Similarly, the private sector is also in great need of profitable investment opportunities. The two partners are thus equally interdependent on each other.

The next chapter deals with the methodology of risk-sharing relating to partnership agreements between the public and private sectors, it also deals with the practice and contains critical comments based on data of certain British contracts published in professional literature and on data characteristics for recent contracts signed for higher education projects.

The technique of risk-sharing based on the example of a higher education investment

The essence of the risk matrix is the following: the contracting parties quantify and make a list of the risks that are relevant for them and by shifting some of the public sector risks to the private partner they create a better chance to provide a service which is more efficiently managed and is available at a lower cost. Although originally the basic logic behind choosing a partnership was not risk management, today it is quite frequent that the scheme itself is legitimised by the risk matrix. Preliminary efficiency calculations, which support the implementation, as well as settlements made in the course of operation, are fundamentally influenced by risks. What seems to be even more important for the state is that the statistical classification of the project is also based on risk-sharing.

Below the risk-sharing matrix of a PPP project designed to build a university campus in Hungary is presented. Based on the review of several similar PPP contracts, the matrix below can be regarded as a typical one, consequently, there is no need to refer to it by name. It goes without saying that the public tender was invited by the university and the bidder was the private enterprise that won the PPP contract. *(See Table 1)*

The above project serves as an example to investigate whether the principal objective has been met, i.e. did the public sector partner manage to shift most of the possible risks to the private sector partner in order to make sure that the various risks should be assumed by the one which can manage them more efficiently and effectively at a lower price.[22] At first sight, this primary expectation seems to have been satisfied as the bidder accepted to assume risks in 22 points, whereas the contracting authority's risks are limited to 17 points, of which four

Table 1

RISK-SHARING MATRIX

	Bidder	Contracting authority
1 Risks emerging during preparation and implementation		
2 Specification of technical parameters (Output specifications)		X
3 Comprehensive design (conformity to specifications, administration of design, etc.)	X	
4 Delivery of work site, suitability of work site (soil, environmental solution, archaeological finds, hidden defects, etc.)	X	X
5 Licensing (building permit, occupancy permit, etc.)	X	(X)
6 Comprehensive construction-execution (quality, cost, availability of capacities, etc.)	X	
7 Contingent external factors delaying execution (strike, weather, etc.)	X	X
8 Assumption of risk, liability for the Establishment	X	(X)
9 Environmental requirements	X	(X)
10 Delayed performance (penalty)	X	
11 Cost overruns	X	
12 Risk of interest rate change of the investment loan	X	
13 Risks emerging during operation, maintenance	**Bidder**	**Contracting authority**
14 Assumption of risk, liability for the Establishment	X	(X)
15 Maintenance costs	X	
16 Hidden construction defects, differences (including design faults)	X	X
17 Availability, performance of service	X	
18 Change in operational costs (materials and wages, administration, project operational costs)	X	
19 Change in public utility charges		X
20 Risks related to use (risks in connection with operational and maintenance cost increases due to a use significantly exceeding the use defined in the Output specifications)		X
21 Demand risks		X
22 Environmental norms	X	
23 Maintenance	X	
24 Change in base interest rates		X
25 Financial and legal risks arising during the whole term of the Project	**Bidder**	**Contracting authority**
26 Exchange rate (rental fee)		X
27 Changes in general taxation conditions (duties, corporate taxes, local taxes, etc.)	X	X
28 Changes in general taxation conditions (public dues on employment relationship, general administration fees, dividend tax)	X	
29 VAT (scope and extent)		X
30 Scope and costs of insurance (property and liability insurances) and bank guarantees (completion and operational guarantees)	X	
31 Changes in the general legal framework	X	X
32 Force majeur	X	X

Sign (x) in the table indicates the risk assumption of the Bidder in specific cases in accordance with the Service Agreement

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Signatures of Bidder and Contracting Authority

are assumed by it only with certain conditions. A more detailed analysis, however, will offer a more nuanced picture.

Risks of the business partner and the state

By citing the above concrete example, we can analyse which are the factors that the business enterprise assumes responsibility for, and in what way.

1 The full scale of implementation. These items that carry the risk of potential losses are, however, very close together in time and are expected to be closed within one or two years, whereas the total term of the project extends to 25 years.

2 Factors that may arise in any type of investment. In managing these items the business organisation certainly does have a routine.

3 Risks associated with assets. For a business enterprise these are more efficiently manageable than the risk of providing the service.

4 Often, the same risk is repeated under different points: for example, what is included under point 11 is already addressed under point 6, and the same is true for points 15 and 23.

5 The private organisation assumes responsibility for risks whose occurrence is very improbable, for instance, under point 28 it accepts that it will not shift additional public dues on wages to the principal if wages happen to rise. But if they happen to go down, it will understandably pocket the resulting profit. On the list of public taxes Hungary ranks second on the European table, so understandably, there is a continuous public debate today – as there already was in 2007 – on the inevitable necessity to reduce public dues. Clearly, the business organisation did not take a great risk by accepting point 28.

6 The business organisation assumed certain risks that belong to the responsibilities of the operator under points 8 and 14. These risks are logically not transferable, because in a PPP contract the public institution only assigns the private enterprise to provide a service, but when the service is actually provided it no longer has any control of it, for example, the contract specifies the provision of building with heating but the public institution has no right to enter the boiler room. It is obvious that it is impossible to shift this responsibility to the users of the service.

7 The methods of risk management are also classified as risk elements, see – for example – point 30.

8 Under points 10 and 16, the business organisation accepts the risk of its own implementations, which certainly do not represent any additional risk-taking.

9 Under points 15 and 19, it shifts certain partial components of the risks to the other party, for instance, it accepts maintenance costs, but does not accept public utility charges which probably represent the largest portion of maintenance costs due to the very nature of the project.

For what factors does a public institution assume risk responsibility and in what way?

10 Points 2, 20 and 21 contain real and high risks, especially because the term of the project is so long that the detailed specification of the service cannot be defined with a great certainty, and because actual demand cannot be effectively estimated for a time well into the future. Although it is indeed a risk which is quite difficult to manage, however, a public institution is more likely to be able to exert an influence on this factor.

11 Changes in the base rate and foreign exchange risk – covered under points 24 and 26 – also represent actual risks. Since the date of the signing of the contract practical experience has supported the view that the university is totally

incapable of managing such risks. Assuming the foreign exchange risk without any coverage has proved to be an irresponsible decision which has caused serious damage to the parties concerned. Even a theoretical argument for the given solution is impossible since financing was undertaken by the business organisation, and for the public institution to accept the inherent risks of financing is but an incredible solution.

12 The risk of changes in the tax regime, especially in VAT – e.g. more stringent rules regulating VAT refund – was indeed a reality, however, its consequences would have been less burdensome for the public institution than for the investment organisation which could have suffered considerable damage due to the very size of VAT. In this case, the public institution was generous to assume a risk which is a risk assumed by the investor in practically all other types of business contracts.

13 The usual sources of risks incorporated in business contracts, such as changes in legal regulations, delays caused by weather conditions, force majeur, are equally borne by the partners, despite the fact that, as a general rule, a public institution is less vulnerable to changes in legal regulations than a business organisation, consequently, the public institution would be less affected even without risk-sharing.

The wording of the contract also shows that all additional liabilities not specified in the contract will be borne by the public institution. For example, non-business risks are clearly not identified as they fall outside standard business thinking. If the contract is cancelled the public institution is obliged to accept another serious burden, i.e. to pay all damage caused to the business organisation in one lump sum, including the estimated profit lost throughout the whole tem of contract. These conditions provided for in the contract make it practically impossible for the public institution to withdraw before the end of the term. Although the risk matrix makes no reference to it, there is an

annual inflation index applied for the service fees, in other words, the business organisation does not even accept the considerable macroeconomic risk of inflation, whereas conceivably there is no guarantee to index the norms of the public institution, or to increase its revenues in proportion to the service fee rise.

Similarly, the risk matrix makes no reference to the well-known fact that the financing of investments in higher education is shared between the institution and the competent ministry. The higher education institution usually calculates its own proportion of the fees, and includes it in its budget even thought the project is expected to cost twice as much for the national economy.

The risk matrix usually varies from project to project, but most of the above critical remarks often reoccur not only in Hungarian contracts but also in contracts worldwide. Typically, risk-sharing has two disadvantageous outcomes from the perspective of the state. Firstly, the public institution accepts risks which it cannot efficiently manage, which leads to unjustifiably great additional expenses in the PPP scheme. Secondly, the state transfers too much of the risks to the business organisation which will incorporate these risks in its pricing, and consequently in its fees, which drives the PPP service fees unreasonably high for the state.[23]

A number of recommendations have already been published to offer a solution for the reduction of the above-described real risks. It would be reasonable for the state to collect the experience of recurrent transactions, to learn a lesson from them, to elaborate standards and to convert foreign expertise. Practically each and every report dealing with this subject published by the British National Audit Office (NAO), as well as the State Audit Office (SAO) encourages the state to do the same. According to Froud, the risk can also be reduced by using the same private partners in different projects, although this practice may pose the danger of

creating monopolistic positions which is certainly to be avoided. (Froud, 2003, p. 582l)

As due to the public procurement regulations there is no opportunity to build long-term partnerships of trust, the public institution may very well find itself in an uncomfortable position in which it obliged to sign a contract with a term of several decades with a partner it has never met before. This particular risk for the public institution can be somewhat compensated by collecting large amount of additional information about the private partner, i.e. the absence of a traditional spirit of trust can be substituted by some sort of calculative trust. (Baretta, 2008)

The risk exposure of the state can also be reduced by keeping the assets generated by the project in state ownership, however, this is contradicted by a much stronger consideration, i.e. the assets of the project represent off-balance sheet items for the state and the commitments must remain an item outside the budget deficit. In contrast, the private partner is specifically interested in incorporating the new assets among its total business assets as it is also interested in financing the project from expensive bank credit to make use of tax concession.

CONCLUDING REMARKS

The picture would not be complete without making the point that the additional risks in PPP are partially compensated by certain advantages. The co-operation between the private and public sectors does strengthen the public institutions concerned in three important areas provided the focus is placed on operation based on efficiency, is placed on competition and contractual relationships. These are beneficial side effects which have a direct influence on the public institution concerned, but they are not taken into account in investment efficiency calculations. The carry-over effects of investments cannot be easily included in the traditional decision-making mechanism, although the practice of making estimates on the level of the multiplier goes back to a tradition of several decades. These effects go far beyond the public institution that implement the investment, the impacts exerted on regions or the national economy as a whole may also be felt; this is evidently determined by the magnitude of the project described by various parameters. Beyond the above, all major investments have other – not directly economic – consequences which are also not project-dependent, but their quantification is even more difficult. These may include, for instance, impacts exerted on the health state, the qualification level and mobility of the society, but they may also extend to changes in environmental load and to political consequences. It is generally easy to classify the effects into the category of positive or negative externality, nevertheless, they can only be taken into account in the judgment of investments if their extent can be expressed at least in a natural unit of measurement, and if there is a ranking or a list of preferences for registering the interrelation of extern effects.

Consequential impacts also appear in the business sector and are in all probability taken into consideration before a long-term partnership co-operation is stipulated in a contract. In this sector, however, only the side effects, which concern business organisations, are reviewed because the factors going beyond the enterprise are likely to have an influence on the competitors as well, consequently, they do not represent a competitive advantage or a disadvantage. Business organisations are generally indifferent towards other consequences which point beyond economic impacts.

It is apparent that the business sector has already taken steps to reinforce its economic interests in risk management, and it also endeavours to strengthen its position in other

aspects of the partnership. It is certainly able to adjust to the present environment whose regulation is somewhat contradictory. The weaknesses of the public sector in enforcing its interests were taken notice of by the public, too. The problems were often addressed in reports drawn up the State Audit Office, whose recommendations also relied on the experience of its British partner organisation, the NAO. If the government becomes determined to support the remedying of the systemic deficiencies, a major work of several years may commence even in Hungary as a result of which the state will be capable of more strongly enforcing the public interest within the framework offered by PPPs. Standardisation is still underway even in the United Kingdom, although the first legal regulation of PPP was introduced as long as fifteen years ago. The identification of deficiencies, such as the adaptation of the accounting and taxation frameworks is still far from being closed. (Khadaroo, 2005) In a care-fully structured and updated legal environment, both the probability of abuses and mistakes can certainly be reduced by using highly standardised solutions and by applying a multi-layer control system.

Unfortunately, the above-mentioned efforts do not extend to the shortcomings in the theory of risk management. As long as PPP continues to be a controversial tool for the state and as long as large-scale state projects are judged exclusively through business perspectives, decision-makers will continue to consider risk as the possibility of a calculable business loss only, and macro-dimensional components as well as aspects of hardly quantifiable uncertainty will not be taken into account in the government's considerations. If risk management continues to be handled in the future the way it is handled today and public institutions continue to operate only as quasi-equal partner in a playground alien to them, their ability to represent their interest will continue to lack force.

NOTES

[1] See Van Horne, J: Capital-budgeting decisions involving combinations of risky investments, Management Science, 1966/11, pp. 84–92

[2] See Lachmann, L., M.: Capital, Expectations, and the Market Process / Sir John Hicks On Capital and Growth (1940) website edition, http://files.liberty-fund.org/files/97/Lachmann_0721_EBk_v4.pdf

[3] See Stigler G., J.:The Economics of Information, The Journal of Political Economy, 1961/06, pp. 213–225

[4] See Sharpe, W., F.: Capital Asset Prices A Theory of Market Equilibrium under Conditions of Risk, Journal of Finance, 1964/9, pp. 425–442

[5] See Lintner, J.: Prices, Risk and Maximal Gain from Diversification Journal of Finance, 1965/12, pp. 587–607

[6] A detailed description of the approach is given in the cited work of J. Froud based on the works of Adams.

The same school of thought is presented as the Sharpe approach in the work of Bélyácz I. which is quoted in this study.

[7] Keynes, J., M.: A Treatise on Probability, 1921

[8] See De Carvalho: Keynes on probability, uncertainty, and decision making, Journal of Post Keynesian Economics, 1988/11, pp. 66–99

[9] See Beck, U.: The Truth of Others, Common Knowledge, Symposium, 2004, pp. 430–449

[10] Giddens, A.: Risk and Responsibility, Modern Law Review, 1999/1, pp. 1–11

[11] See Kahneman, D. – Lovallo, D.: Timid Choices and Bold Forecasts: A Cognitive Perspective on Risk Taking, Management Science, 1993/1 pp. 17-31, and Kahneman, D. -Tversky, A.: Judgment under uncertainty: Heuristics and biases, Science, 1974, pp. 1124–1131

[12] See Good, J.: How Rational should a manager be?, Management Science, 1962/7, pp. 383–393

[13] The school of thought is discussed by Ulbert J. and Csanaky A. in their work cited in this paper. Hámori's work referred to above describes the work of Kahneman on decision theory.

[14] Davidson, P.: Is Probability Theory Relevant for Uncertainty? A Post Keynesian Perspective, Journal of Economic Perspectives, 1991/winter pp. 129–14 and Davidson, P.: Risk and Uncertainty in Economics, Journal of Post Keynesian Economics, Conference paper, 2009/2

[15] This list can be found in pages 492–493 of Bélyácz's cited work.

[16] The cash flows of investments, the total yields – in other words, the present value of the asset – can always be described as a difference between revenues and fixed or variable costs. If we accept that the β of the revenues and variable costs is identical (it is sensible as they move together), and the β of the fixed costs is 0, then it can be proved that the projects in whose cash flows the proportion of fixed costs is higher are riskier (Brealey – Myers, 1999, pp. 212–213).

[17] The study was conducted among USA, Canadian, Australian and UK managers, its results are described by Horngren and his co-authors on page 737 of the cited work.

[18] The above-mentioned modes of co-operation are described in details in the study of the Hungarian SAO Research and Development Institute (2007) cited in this paper.

[19] Contracts are always concluded for a fixed period of time, for example, the Hungarian motorway projects were concluded for 26–27 years, and the higher education contracts for 20 years.

[20] Design-Build-Develope-Finance-Operate-Transfer

[21] The quotation derives from Government Decree 161/2005. (VIII. 16.). According to paragraph (2) cited above, the applicable interest rate is published, in a monthly breakdown, for a period of 35 years, by the National Debt Management Centre Plc on the homepage of the Ministry of Finance.

[22] The two are not necessarily concurrent, the PPP Handbook already cited above – for example – cautions against shifting too much of the risks, saying that it may frighten off the business organisation from the project.

[23] It is almost as if the business and the public sector partners were playing heads or tails with risks, if it is head the former wins, if it is tail the latter loses.

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