Hetesi E. – Vas Zs. (eds) 2015: *New Ideas in a Changing World of Business Management and Marketing*. University of Szeged, Doctoral School in Economics, Szeged, pp. 173-185.

13. Study of the Operational Risk of 3166 Local Governments in Hungary between 2003 and 2012

Loss and Risk Aversion in State-Financial Decisions

Gábor Kozma

In the process of shaping up the theoretical framework, we substituted operational incomes and expenditures into the value function of prospect theory. By this we achieved that the results of economic psychological research concerning loss and risk aversion could also be applied in the analysis of state financial decisions. Discretionary decisions can be placed in distinct reference frameworks on the side of both incomes and expenditures. Decisions made in risky situations can be analysed with both utility axioms and in the conceptual framework of psychological value.

Because of the properties of the operational system of the modern state, we gave preference to the psychological approach of the behavioural economics. By this approach, we determined the theoretical value of the operational risk of discretionary decisions, which we interpreted as inherent risk and, in the course of an empirical study; we made it correspond to the experiential values.

Instead of the macroeconomic level of the state's role-taking and operational risk, we have focussed our research on the system of subnational governments. Wide and detailed secondary data are available about Hungarian local governments, so we carried out our research on a large number of these. Virtually, based on treasury date, we studied 3166 Hungarian local governments in the period between 2003 and 2012.

The result of the statistical analysis is the fact that Hungarian local governments made their financial and budgetary decisions by taking considerable risk concerning their environment. The local governmental level treated their uncertain operational environments in a risk-preferring manner and the established level of risk relatable to discretionary decisions between 2003 and 2012 came to over the theoretical value in the vast number of Hungarian local governments studied.

Keywords: behavioural economics, prospect theory, modern state, operational risk

1. Introduction

The aspects of operational risk management of credit institutions can be applied to the analysis of decisions in state household financial-economic management. Credit institutions are specific, property-based risk-taking communities, where the credit institution, as a private enterprise, apart from its fundamental business activity, takes considerable social responsibility for the availability of certain groups of assets, including undisturbed operation of payment systems or repayment of deposits. Taking this responsibility towards the economic environment

can be so great that the credit enterprise establishes a risk-taking community, which can be extended to those beyond directly affected. In a given case, credit institutions represent too large financial size in the economy to create durable operational trouble in their fundamental activities ("too big to fail"), therefore, it is of social interest to save them (Botos 2014, Rajan 2005, 2010).

A similar situation can be identified at some institutions of the state, especially in the case of natural monopolies and, eventually, in the whole of the operation of the state itself. Further on, we shall apply the above generalization to the state, then to the local level of the operation of the state, which, similarly to credit institutions, does its activity in a special environment concerning operational risk.

Operational risk demonstrates the internal balance of the state's institutional system and the sustainability of its institutions, proportional to the demands of the environment. Operational balance exists between the resources tapped from the environment and the goods produced for the environment. The financial conditions of continuous accommodation to the environment are provided by the state budget, which we interpret as a sensitive subsystem within the framework of the functioning of the state, ensuring and allocating the resources in a balance-creating manner. As our objective is the interpretation of operational risk, further on we study the operational budget of the state[1].

Looking at the sides of income and expenditure together, we can see that considerable social, economic and natural environmental problems may remain unsolved, in case the state covers the operational costs from the regulated tax bases of optimal size and adjusts it to the operational income from the optimal extent of taxes. In this case, the state has used up all the information for making decisions on the side of income, on the side of expenditure, however, it

[1] Calculations for the balance of the budget can be done according to different kinds of international statistical systems. Statistical and state accountancy systems separate the operational, cumulative (capital) and financial transactional parts of state budgets. Processes of cumulative budget related to property items do not directly influence the development of budget. Transactions connected with state property aim to continuously transform (expand, reduce) institutional capacities, which are connected with changes in operational processes with time lag. A process of restructuring an institution appears at the end of a series of operations in altered capacity indices influencing the extent of operational costs, so its effect is built in the state operational budgetary estimates with some delay. In the system of budgetary estimates financing operations play a balancing role, therefore neither logically nor according to typical financial-technical solutions do they belong to the sphere of concepts of budgetary estimate (Vigvári 2008).

has ignored several demands. On the contrary, using up all the information on the expenditure side, in other words, bringing the size of institutional capacity closer to the possible demands, overburdening the possible tax bases or overtaxing the regulated tax bases appear as social and economic drawbacks. Because of the above, we ascribe the positive or negative balances of operational budget to the uncertainty of the operational environment of the state. Looking at any period of time, regulated tax bases or making demands on institutional capacities may fluctuate irrespective of each other.

Therefore, we look at operational risk as something determined from the outside: the system of conditions, to which state decision-makers have to respond, depends on the changes in the state of the environment. Operational budget gives a good approximation to the uncertainty and imbalance of operational environment, the negative value of which expresses the operational risk of the state related to its external environment. The presence of operational risk, its statistic fluctuation and also its unexpected, accidental change mean special operational conditions and constant compulsion of accommodation for the state household. Therefore, the modern state maintains an internal regulatory system, by which it ensures the sustainability of its operation. Regulation-based operation and normativity curbs the influence of external effects affecting the system (Allen − Tommasi 2001, Barr 2009, Lengyel − Rechnitzer 2004, Musgrave − Musgrave 1989, Stiglitz 2001, Szabó − Hámori 2006, Vigvári 2008).

2. Interpretation of loss and risk aversion in state-financial decisions

From the point of view of the state, we can interpret the phenomenon of loss and risk avoidance in two ways: from the aspect of relations to the external environment on one hand and the aspect of the internal environment of state economic management on the other. The relations to external (political, economic, social and natural) effects can, under certain conditions[2], approach the expectations of the individual. In certain situations, the decision-making mechanism of the state can be motivated in minimizing the individual's losses, since in a given case; they are just directed to this. The establishment of the historic state, its existence presume the essential demand of the individual for security, his inclination to avoid losses and risks. For

[2] We have borrowed the informational conditions from the Tiebout Hypothesis, which we have taken as the informational background for state household decision-making processes (Vigvári 2008).

the individual gives up part of his / her freedom to make decisions when joining the risk community, in order to increase his / her security and welfare.

In case of discretional decisions, relation to the demands appearing in the external environment is very strong and the decision can depend on special reference points: in financial sense it is of base approach and in economic-psychological sense it is path dependent[3]. In case of decisions of such informational background, the state's decision-maker is forced to identify itself with the loss of citizens; therefore it discerns loss as early as during the preparation of the decision and wants to move towards a lesser loss from the beginning. From the behavioural-economic point of view, presuming Kahneman and Tversky's value function, the state originally moves within the range of loss. Depending on the reference framework shaped during the preparation of decision, virtually it is ready to make the move from any reference point. To put it in neoclassical terminology, in this situation the state decision-maker is necessarily risk-favouring (Kahneman − Tversky 1979, Thaler et. al 1997).

Specific examples include state expenditure decisions made in relation to wars, environmental catastrophes or those made in connection with economic bail-out packages, where the state runs a great risk spending high-value amounts, though at an ignorable probability of occurrence4. However, we presume the phenomenon in the case of decisions made in connection with discretional operational expenditure policies regarding those of below mean or, from the budgetary point of view, ignorably small sizes, however, made in outstandingly large numbers, which we study in the framework of empirical research.

Normative state-financial decision can be opposed to discretional decision-making. It is necessary to link state resources with expenditure policy, which is built on the informational basis of politics and sectoral policies and on the analysis of the external environment. Raising funds and their addition to expenditure are generalizable, irrespective of the political system, and are separated from the discretional decision-making mechanism. The aspects of sustainability of the internal environment of the state structure appear besides political and sectoral decision-

[3] To support path dependence empirically, a large number of laboratory experiments have been carried out by research groups dealing with this topic. A very interesting and elucidative series of experiments were demonstrated by R. Thaler. They analysed rounds of television quiz programs utilizing both neoclassical utility functions and the value function of prospect theory. During laboratory experiments related to analyses, they demonstrated the path dependence of decision-making in risky situations (Post et al. 2008).

[4] For this situation, based on the statistical distribution, the term "tail risk" is used.

making, which are typically financial-budgetary decisions. In the course of preparing budgetary decisions, the state's institutional system creates reference points of normative character, and the bargain-mechanism of rule-based planning of budget enforces a proportional distribution of resources among sectoral interests.

In behavioural-economic sense, assuming Kahneman and Tversky's value functions, the state moves in a profit range when imposing taxes. In the positive value range, systematic errors and distortions disclosed by behavioural economics can be identified in decision-making – the behaviour of the state is necessarily short-sighted and loss-avoiding. In neoclassical terminology, when making tax regulations and imposing taxes, the state's decision-maker acts in a risk-neutral and risk-avoiding way, therefore the state's income-political risk-taking should be definitely encouraged.

Taking into account the fairly large number of discretional decisions, we can presume that the state is ready to spend money on environmental risks rather than raise taxes. All this can be as well interpreted as a decision motivation aiming to minimize environmental losses. In this interpretation, one average income-raising state decision (decision unit), calculable depending on the theoretical economic approach, is due to a given discretional operational cost-related decision (decision unit).

Further on, we shall refer to the loss-avoiding motivations of discretional decisions as the inherent risk of operational budgetary processes. We use the term to express the risk content of state-financial, operational decision-making situations resulting from the environmental conditions and its degree deducible from theoretical assumptions.

Thaler introduces the utility function for loss aversion in a neoclassic basis, intuitively, with a rule of thumb applying a coefficient of 2.5, which can be used for state incomes and expenditures. Studying the value function of prospect theory we can produce a similar situation. The λ coefficient per unit of money, connected with expenditures and expressing the extent of loss aversion will be the 2.25 fold of the unit connected with incomes (Thaler et al. 1997).

Incomes and expenditures originated from coefficients expressing the extent of loss aversion generate theoretical operational deficit. By intuitive, neoclassic treatment, its extent, irrespective of the size of budget, projected onto balance sheet total of operational expenditures is 60 %, using the value function of prospect theory it will be 55.6%. Further on, we shall use theoretical operational deficit to express the extent of inherent risk.

We have given preference to the analytical framework suggested by behavioural economics for the following reasons:

- In the course of analysing operational risks, we rejected the necessity of analysing property, since the chance of occurrence of risk events and its potential effect is irrespective of the financial size of it. The changes in operational environment it decisively depends on, for the description of which the value function of prospect theory provides a suitable analytical framework (Benartzi − Thaler 1995, Chernobai et al. 2007, Kahneman − Tversky 1979, Thaler et al. 1997).
- We have taken the risk community of the modern state as non-property-based, so the concept of profit and loss, related to the reference points of the external and internal environment is more suitable for the description of state-financial processes of decision-making (Benartzi − Thaler 1995, Kahneman − Tversky 1979, Kahneman − Thaler 2006, Post et al. 2008, Thaler et al. 1997).
- The risk community of the state is not voluntary; consequently, undertaking some loss is an inevitable, certain event. The value function of prospect theory offered an obvious and suitable analytical framework to the explanation for situations containing certain loss as well (Kahneman − Tversky 1979, Post et al. 2008).

The budget bearing a relative operational risk of 0% and treated on a completely normative basis can be identified at the macro-level in the course of planning and implementation of central budgets. However, the equilibrium stated in a budgetary golden rule is rarely fulfilled by the elementary budget drawn up by institutions at the micro-level, and sectorial balance-sheets at mezo-level. The category introduced for operational risk can be well applied at the level of local governments, where we can presume that state decision-making is attached to its external environment far more intensively. We can also presume that local discretional state-financial decision-making is more heavily influenced by the direct reference points of the external environment than the normative framework of decision-making mediated by the central budget.

3. Results of empirical research

Instead of macroeconomic role-taking of the state, we have focussed our research on the mezo-level: the system of subnational governments. A wide range of secondary, duly detailed data has been available about Hungarian local governments. These data can be made suitable for arranging them in a data group according to a theoretical approach and defining the statistical variables. Therefore we have carried out our empirical research on the universe of Hungarian institutions (Sándorné 2009, 2014, Vigvári 2009).

We have obtained the basic data containing the operational incomes and expenditures related to the total Hungarian system of local governments from the reports of the Hungarian State Treasury for 2003-2012. We had to handle the essential content-related and accounting technical differences resulting from the specificities of the legal responsibilities of the Hungarian local governmental system and from the extreme deviations between the operational sizes of the individual local governments. That is why we left the regional (capital city and county) local governments out of the scope of local governments studied. The outstanding operational size of Budapest, its national weight characterized by an 11.6% mean chronological rate was another argument for leaving it out of the empirical research. The large number of the local governments in small settlements did not cause any substantial problems in the process of treatment of data sources.

The pieces of information collectable about the local governmental system from the State Treasury are burdened by chronological inconsistencies. Difficulties were caused by changes in the structure of items of book-keeping and in the mandatory contents of the individual items on the one hand, and the administrational categorization of settlements on the other. Typically, changes in the status of public administration involved merger or separation of settlements, which changed the number of local governments obliged to give accounts. Following up changes demanded the chronological reconstruction of changes in financial and budgetary regulations. Owing to this, chronological retrospection caused serious difficulties, which, by limiting the period of time, could be more or less resolved. The available Treasury information back to 2003 was reliably interpretable. However, the content of data of Treasury reports before this budgetary year changed to such an extent that the identification of data and ensuring their comparability would have needed a disproportionally great effort compared to the presumable information content. Therefore, we indicated 2003 as a year for starting the study. The Hungarian system of local governments has made

a radical turn since 2013, the process of decentralization beginning in 1990, burdened by continuous political and sectoral policy conflicts, completely broke. The solution of problems since 2013 has been taken over by a centralized management, creating several ministerial background institutions. A substantial investigation of the effects of this reform needs a longer period of time, which could be subject to a following research. Because of this, we finished our study by the year of 2012 and have not processed the next accounting years closed by reports.

For time-related comparability we fixed the settlement structure of 2003, then the data of the meanwhile separated settlements according to the state in 2003 and registered them united for the original list of settlements in each analysed year. In case of settlements merged in the meantime, we cancelled the data of the settlement that was absorbed into the other for 2003 as well and stated the value data at the adopting settlement in each analysed year. By the rearrangement of value data we achieved that the analysed sets of data have been included in a uniform structure regarding a period of 10 years. In this way, by leaving the regional local governments out, our analysis included 3166 settlements of the Hungarian local governmental system concerning the period between 2003 and 2012.

Based on the theoretical theses of behavioural economics in relation to loss aversion we have put the following statements:

H1. Discretional state-financial decisions result in at least the level of relative theoretical operational risk (55.6% of inherent risk).

At the same time, the inherent risk is necessarily curbed by the regulation-based decision-making environment to a tolerable level, the concrete value of which – typical of the universe of Hungarian local governments – we have been searching for.

Without the mechanism of action of normative decisions budgetary system could fail:

H2. Because of this, normative state-financial decisions should keep relative operational risk, generated by discretional decisions, far below the level of the inherent risk. Theoretically, operational risk can be mitigated by normative decisions to 0 %.

We measured the individually calculated relative operational risk of Hungarian local governments for a given t year in the proportion of the difference between fulfilled operational income and estimated expenditure and fulfilled estimated expenditure (ROR index) of each local government. The proportional indices of relative risk bore unique information regarding the decision-making entities, which we processed for the whole universe. The statistical characteristics concerning

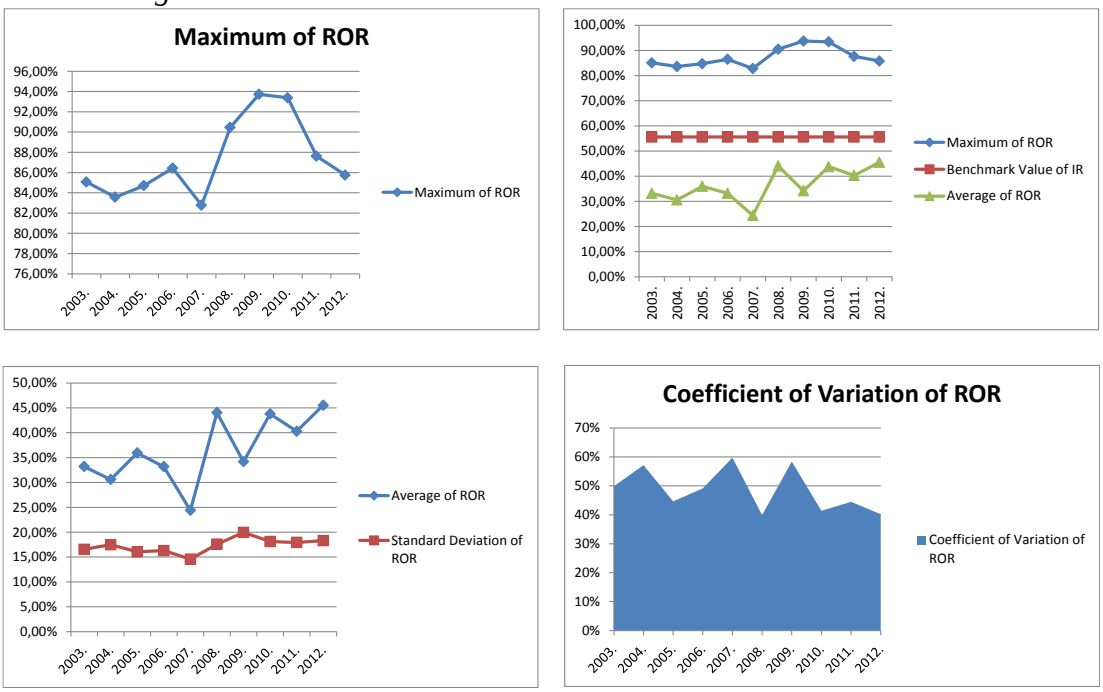
the whole universe are demonstrated by the simple position indices of the variable in Table 1 and in Figure 1.

Table 1 Universal Characteristics of ROR Variable between 2003-2012

Universal Characteristics per Year of *ROR* Variable	**2003.**	**2004.**	**2005.**	**2006.**	**2007.**
Maximum of *ROR*	85,07%	83,57%	84,71%	86,44%	82,78%
Benchmark Value of IR	55,56%	55,56%	55,56%	55,56%	55,56%
Average of *ROR*	33,21%	30,59%	35,94%	33,18%	24,39%
Standard Deviation of *ROR*	16,55%	17,48%	16,04%	16,30%	14,57%
Coefficient of Variation of ROR	50%	57%	45%	49%	60%
Universe (N)	3 166	3 166	3 166	3 166	3 166
Risk Events (n)	2 942	2 851	3 030	3 005	2 868
	2008.	**2009.**	**2010.**	**2011.**	**2012.**
Maximum of *ROR*	90,46%	93,72%	93,39%	87,61%	85,76%
Benchmark Value of IR	55,56%	55,56%	55,56%	55,56%	55,56%
Average of *ROR*	44,03%	34,18%	43,78%	40,30%	45,52%
Standard Deviation of *ROR*	17,57%	19,96%	18,12%	17,93%	18,31%
Coefficient of Variation of *ROR*	40%	58%	41%	44%	40%
Universe (N)	3 166	3 166	3 166	3 166	3 166
Risk Events (n)	3 111	2 911	3 105	3 080	3 100
Time Series Average of:	**Time Series Characteristics of ROR between 2003-2012**				
Maximum of *ROR*			*87,35%*		
Benchmark Value of IR			*55,56%*		
Average of *ROR*			*36,51%*		
Standard Deviation of *ROR*			*17,28%*		
Coefficient of Variation of *ROR*			*48%*		
Risk Events (n)			*3 000*		

Source: own construction based on Hungarian State Treasury balance sheets

Figure 1 Universal Characteristics of ROR Variable between 2003-2012



Source: own construction based on Hungarian State Treasury balance sheets

To measure the level of relative operational risk resulting from the background processes forming the microenvironment of discretional decisions, we used the mROR indicator (modified relative operational risk indicator), which expresses the rate of difference between local tax incomes and tangible expenditures projected onto tangible expenditures. Changes in modified relative operational risk indicator between 2003 and 2012 are shown in Table 2 and in Figure 2.

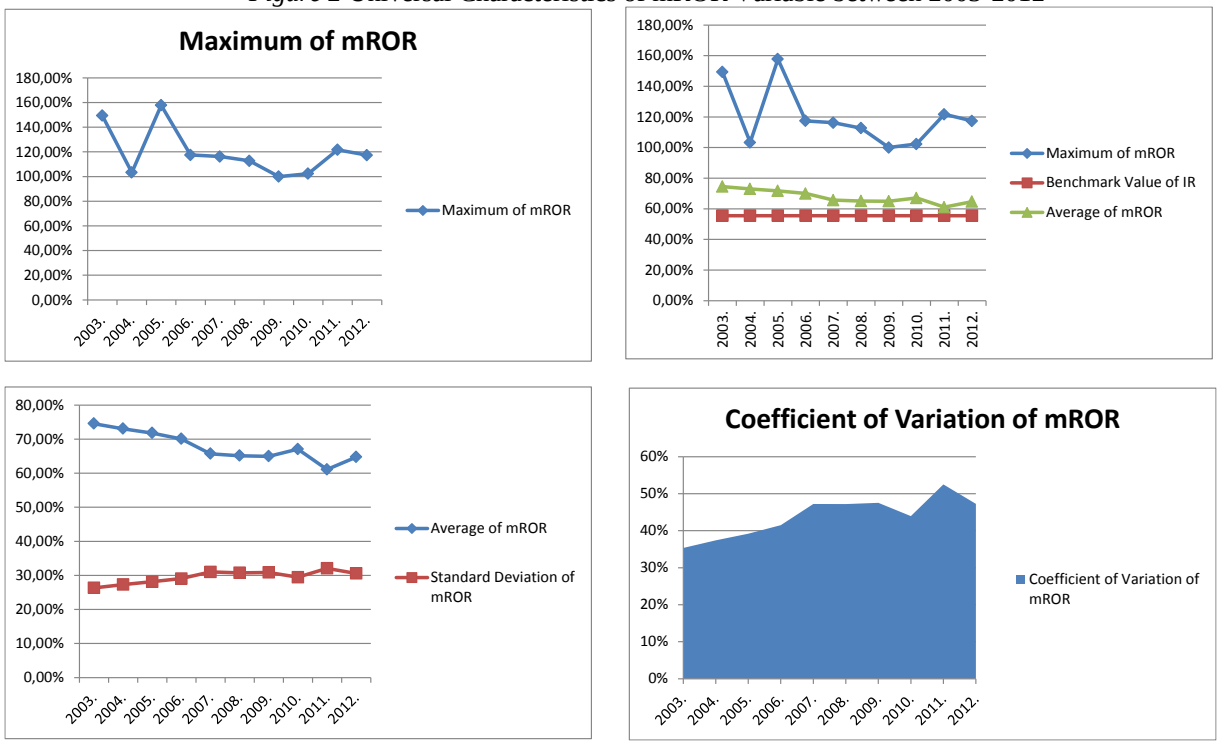
Table 2 Universal Characteristics of mROR Variable between 2003-2012

Universal Characteristics per Year of mROR Variable	**2003.**	**2004.**	**2005.**	**2006.**	**2007.**
Maximum of *mROR*	149,41%	103,32%	157,79%	117,44%	116,21%
Benchmark Value of *IR*	55,56%	55,56%	55,56%	55,56%	55,56%
Average of *mROR*	74,53%	73,04%	71,77%	70,05%	65,68%
Standard Deviation of *mROR*	26,34%	27,31%	28,13%	29,07%	31,02%
Coefficient of Variation of *mROR*	35%	37%	39%	42%	47%
Universe (N)	3 166	3 166	3 166	3 166	3 166
Risk Events (n)	2 942	2 851	3 030	3 005	2 868
	2008.	**2009.**	**2010.**	**2011.**	**2012.**
Maximum of *mROR*	112,74%	100,00%	102,32%	121,70%	117,34%
Benchmark Value of *IR*	55,56%	55,56%	55,56%	55,56%	55,56%
Average of *mROR*	65,13%	64,95%	67,06%	61,07%	64,72%
Standard Deviation of *mROR*	30,74%	30,87%	29,47%	32,07%	30,58%
Coefficient of Variation of *mROR*	47%	48%	44%	53%	47%
Universe (N)	3 166	3 166	3 166	3 166	3 166
Risk Events (n)	3 111	2 911	3 105	3 080	3 100
Time Series Average of:	**Time Series Characteristics of *mROR* between 2003-2012**				
Maximum of *mROR*			*119,83%*		
Benchmark Value of IR			*55,56%*		
Average of *mROR*			*67,80%*		
Standard Deviation of *mROR*			*29,56%*		
Coefficient of Variation of *mROR*			*44%*		
Risk Events (n)			*3 000*		

Source: own construction based on Hungarian State Treasury balance sheets

The time series average of the relative operational risk (mROR) from the discretional decisions at the mezo-level between 2003 and 2012 at the observed Hungarian universe of local governments came to nearly 68 %. The mean yearly value at the mezo-level each year exceeded the theoretical value of 55.6 % (IR) calculable according to the value function of prospect theory, presuming loss aversion. At the same time, the level of risk (ROR) calculated for the total operational budget, which also expresses the mechanism of action of normative state-financial decisions, was 37 %. The mitigating effect of regulation-based decisions can be well perceived; at the same time, the mean level of decisional micro-environment, far higher than the inherent risk, is a warning sign.

Figure 2 Universal Characteristics of mROR Variable between 2003-2012



Source: own construction based on Hungarian State Treasury balance sheets

We studied this mechanism by the simultaneous application of several risk indicators as well. The evaluation of risk introduces an asymmetric distribution of operational risk according to the categories of operational size in relation to operational expenditures. According to the risk evaluation carried out, the 64-80 % of the value amount of operational risk (OR) was concentrated in 7-13 % of local governments in the period of 2003-2012. The high relative operational risk level and its asymmetric distribution of value amount direct our attention to the contradiction which developed between the efforts of local governments towards their environments and the sustainability of their operational balance and financial resources in Hungary between 2003 and 2012.

4. Suggestions and further directions of research

Theoretical possibilities of research present themselves on the bordering surfaces of the local governmental sector, first of all in connection with modelling the institutional capacities becoming necessary in the direction of local markets, local societies and local natural values. What quantitative and qualitative characteristics does the optimally formulated local

governmental institutional system have, which generates the lowest possible absolute operational risk at the mezo-level? The other bordering surface is the regulatory, controlling and financing system. Essentially, we can ask the same question as before: is there a normative financing model which creates the lowest possible absolute operational risk at the mezo-level regarding local governments? The problem can be approached from many kinds of directions. In my view, a regulatory and institution-building approach underpinned theoretically, treating information with a "rule of reason" attitude, combined with the transformation of financing system stressing the elements of being stuck to rules, can considerably mitigate the absolute and relative operational risk of local governmental system.

Apart from further development of theoretical frameworks, research should be deepened in the direction of methodology as well. The operational risk indicators already established can be divided further. Based on the system of indices accepted in financial analyses, complex, detailed sub-indicators can be constructed, by which we can identify the detailed characteristics of operational risk processes.

The introduced methodology can be applied for the empirical analysis of the local governmental system of the individual states in a complex way. The selection of data sources, getting to know the regulatory system of the particular state, the identification and testing of statistical variables required for the use of the methodology involve serious challenge. The analytical methodological framework, suitable for the international comparison of operational risks, can be made up by the utilization of the experience of studies conducted in a large number at the sectoral level. This direction of development extends the practical application of the method as well, and may yield further theoretical and methodological results that cannot be planned in advance.

References

Allen, R. – Tommasi, D. (2001): *Managing Public Expenditures*. A Reference Book for Transition Countries. OECD Publishing, Paris.

Barr, N. (2009): *A jóléti állam gazdaságtana*. Akadémiai Kiadó, Budapest.

Benartzi, S. – Thaler, R. (1995): Myopic Loss Aversion and the Equity Premium Puzzle. *The Quarterly Journal of Economics*, 110, 1, pp. 73-92.

Botos, K. (2014): Financializáció, avagy a globalizmus menedzsmentfilozófiája. Gondolatok a pénzügyi szektor és az állam szerepének megváltozásáról, valamint az adósságszolgálat teljesítéséről. *Pénzügyi Szemle,* 59, 2, pp. 275-288.

Chernobai, A.S. – Rachev, S.T. – Fabozzi, F.J. (2007): *Operational Risk. A Guide to Basel II Capital Requirements, Models, and Analysis*. John Wiley & Sons, New Jersey.

Kahneman, D. – Thaler, R. S. (2006): Anomalies: Utility Maximization and Experienced Utility. *The Journal of Economic Perspectives*, 20, 1, pp. 221-234.

Kahneman, D. – Tversky, A. (1979): Prospect Theory: An Analysis of Decision Under Risk. *Econometrica*, 47, 2, pp. 263-291.

Lengyel I. – Rechnitzer J. (2004): *Regionális gazdaságtan.* Dialóg Campus, Budapest-Pécs.

Musgrave, R. A. – Musgrave, P. B. (1989): *Public Finance in Theory and in Practice*. International Edition, McGraw-Hill.

Post, T. – Martin J. van den Assem – Guido B. – Thaler R. H. (2008): Deal or No Deal? Decision Making under Risk in a Large-Payoff Game Show. *American Economic Review*, 98, 1, pp. 38-71.

Rajan, R. G. (2005): Has Financial Development Made the World Riskier? *Working Paper*. National Bureau of Economic Research, Cambridge, MA.

Rajan, R. G. (2010): *Fault Lines. How Hidden Fractures Still Threaten the World Economy*. Princeton University Press, Princeton and Oxford.

Sándorné Kriszt É. (2009): The Measurability of Knowledge Creation in the 21st Century. *3rd Central European Conference in Regional Science*, October 7th – 9th, Kosice, pp 748-754.

Sándorné Kriszt É. (2014): A felsőoktatás küldetésének értelmezése és teljesítményének mérhetősége. *Köz-gazdaság*, 9, 1, pp. 61-73.

Stiglitz, J.E. (2001): *A kormányzati szektor gazdaságtana*. KJK-Kerszöv Jogi és Üzleti Kiadó Kft, Budapest.

Szabó, K. – Hámori, B. (2006): *Információ-gazdaság. Digitális kapitalizmus vagy új gazdasági rendszer?* Akadémiai Kiadó, Budapest.

Thaler, R. H. – Tversky, A. – Kahneman, D. – Schwartz, A. (1997): The Effect of Myopia and Loss Aversion on Risk Taking: An Experimental Test. *The Quarterly Journal of Economics*, 112, 2, pp. 647-661.

Vigvári, A. (2008): *Pénzügy(rendszer)tan*, Akadémiai Kiadó Budapest.

Vigvári, A. (2009): Pénzügyi kockázatok az önkormányzati rendszerben. *COMITATUS* , 19,3, pp. 20-29.