

## MATHEMATICAL DIRECT IDENTIFIER MODEL MECHANISMS FOR THE PROBLEM OF INTERACTION OF THE INNOVATOR AND INVESTORS IN THE SYSTEM OF INNOVATIVE INVESTMENT

A.O. GURTUEV, E.G. DERKACH, F.A. MAMBETOVA

Institute of Computer Science and Problems of Regional Management –  
branch of Federal public budgetary scientific establishment "Federal scientific center  
"Kabardin-Balkar Scientific Center of the Russian Academy of Sciences"  
360000, KBR, Nalchik, 37-a, I. Armand St.  
E-mail: [iipru@rambler.ru](mailto:iipru@rambler.ru)

*While for traditional industries the use of statistical data and risk control is a common approach to the problem of uncertainty, for innovation projects such method is not applicable due to the natural lack of a reliable statistical base. In practice we see that the empirical mechanisms used for evaluation of innovation projects are rarely used during investing in traditional industries and vice versa. In this regard, there arises the problem of developing an effective mechanism for managing the investment system under uncertainty in general and the system of innovative investment in particular. The paper proposes a direct revealing mechanism for the innovator-investor system in the form of a Bayesian non-cooperative, repetitive game with recalculated payouts. The equilibrium parameters are obtained for any period of this game. It is shown that the strategic equilibrium for the whole game can be achieved on the basis of the adjustment of a priori estimates of the investor and innovator according to the well-known Regret Matching rule.*

**Keywords:** informational asymmetry, principal-agent models, moral hazard, unobservable behavior, signaling, screening.

### REFERENCES

1. Arrow K. Risk Perception in Psychology and Economics // *Economic Inquiry*. 1982. V. 20(1). Pp. 1-9.
2. Blatt J. Investment Evaluation under Uncertainty // *Financial Management*. 1979. V. 8(2). Pp. 66-81.
3. Greenwald B., Stiglitz J., Weiss A. Informational Imperfections in the Capital Market and Macroeconomic Fluctuations // *AER*. 1984. V. 74(2). Pp. 194-199.
4. Bresnahan T., Levin J. Vertical Integration and Market Structure, in: R. Gibbons and D.J. Roberts, ed. *Handbook of Organizational Economics*, Princeton University Press. 2012.
5. Glaeser E., Johnson S., Shleifer A. Coase versus the Coasians // *QJE*. 2001. V. 116 (3). Pp. 853-899.
6. Nunn N. Relationship-Specificity, Incomplete Contracts and the Pattern of Trade // *QJE*. 2007. V. 122 (2). Pp. 569-600.
7. Acharya V.V., Subramanian K. Bankruptcy Codes and Innovation // *The Review of Financial Studies*. 2009. V. 22(12)/ Pp. 4949-4988.
8. Hart O., Moore J. Incomplete Contracts and Renegotiation // *Econometrica*/ 1988. V. 56(4). Pp. 755-785.
9. Seitz M., Watzinger M. Contract Enforcement and R&D Investment // *Research Policy*/ 2017. V. 46(1). Pp. 182-195.
10. Gurtuev A.O., Derkach E.G., Ivanov Z.Z. *Kontseptsiya innovatsionnogo protsessa kak rynka investitsiy s neopredelennymi tipami uchastnikov* [The concept of the innovation process as an investment market with uncertain types of participants] // *Izvestiya Kabardino-Balkarskogo nauchnogo tsentra RAN* [News of the Kabardino-Balkarian Scientific Center of the Russian Academy of Sciences]. 2018. No. 1 (81). Pp. 17-20.

11. Gagnepain Ph., Ivaldi M., Martimort D. The Cost of Contract Renegotiation: Evidence from the Local Public Sector // AER. 2013. V. 103(6). Pp. 2352-2383.
12. Herweg F., Müller D., Weinschenk Ph. Binary Payment Schemes: Moral Hazard and Loss Aversion // American Economic Review. 2010. Vol. 100(5). Pp. 2451-2477.
13. Laffont J.-J., Martimort D. The Theory of Incentives I: the Principal-Agent Model. Princeton University Press. 2002.
14. Ross S. The Economic Theory of Agency: The Principal's Problem // AER. 1973. V. 63. Pp. 134-139.
15. Gurtuev A.O., Derkach E.G., Ivanov Z.Z. *Sovremennoye sostoyaniye issledovaniy v oblasti obespecheniya ispolneniya kontraktov v usloviyakh neopredelennosti v sistemakh innovatsionnogo investirovaniya* [The current state of research in the field of contract enforcement under conditions of uncertainty in innovative investment systems] // *Izvestiya KBNTS RAN* [News of the KBSC RAS]. 2016. № 5 (73). Pp. 62-68.
16. Harsanyi J. Games with Incomplete Information Played by "Bayesian" Players, I-III. Part I. The Basic Model // *Management Science*. 1967. V. 13. № 3.
17. Harsanyi J. Games with Incomplete Information Played by "Bayesian" Players, I-III. Part II. Bayesian Equilibrium Points // *Management Science*, 1968. V. 14. № 5.
18. Derkach E.G., Ivanov Z.Z., Gurtuev A.O. *Modelirovaniye vzaimodeystviya innovatora i investora metodami teorii igr* [Modeling the interaction of the innovator and investor using game theory methods] // *Izvestiya Kabardino-Balkarskogo nauchnogo tsentra RAN* [News of the Kabardino-Balkarian Scientific Center of the Russian Academy of Sciences]. 2018. No. 1 (81). Pp. 21-27.
19. Gurtuev A. Direct incentive-compatible mechanism for innovator-investor bargain in an innovation investment system. XIV International Scientific-Technical Conference "Dynamic of Technical Systems" (DTS-2018) // *MATEC Web Conf.* 226 (2018). 04032.
20. Myerson R. Perspectives on Mechanism Design in Economic Theory // AER. 2008. V. 98(3). Pp. 586-603.
21. Gibbard A. Manipulation of Voting Schemes: A General Result // *Econometrica*. 1973. V. 41. Pp. 587-601.
22. Groves T. et al. editors. *Information, Incentives, and Economics Mechanisms: Essays in Honor of Leonid Hurwicz*. NED: New edition ed., University of Minnesota Press. 1987.
23. Porter R., Nudelman E., Shoham Y. Simple search methods for finding a Nash equilibrium // *Games and Economic Behavior*. 2008. V. 63. Pp. 642-662.

**Gurtuev Alim Oyusovich**, candidate of economic sciences, leading staff scientist of the Department of the economics of innovation, Institute of Computer Science and Problems of Regional Management of KBSC of the Russian Academy of Sciences.

360000, KBR, Nalchik, 37-a, I. Armand street.

Ph. 8(8662) 47-53-03.

E-mail: [alemao@mail.ru](mailto:alemao@mail.ru)

**Derkach Elena Gennadyevna**, staff scientist of the Department of the Department of the economics of innovation, Institute of Computer Science and Problems of Regional Management of KBSC of the Russian Academy of Sciences.

360000, KBR, Nalchik, 37-a, I. Armand street.

Ph. 8(8662) 40-80-38.

E-mail: [leafleg@mail.ru](mailto:leafleg@mail.ru)

**Mambetova Fatima Abdullahovna**, Doctor of Economics, Associate Professor, Senior Researcher Department of Economics of the Innovation Process, Institute of Informatics and Problems of Regional Management - a branch of the Kabardino-Balkarian Scientific Center of the Russian Academy of Sciences.

360000, KBR, Nalchik, 37-a, I. Armand street.

Ph. 8-903-495-27-22.

E-mail: [sweet-888@mail.ru](mailto:sweet-888@mail.ru)