

## Referee report on doctoral dissertation thesis

“Essays on Endogenous Information Acquisition in Economics”

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The thesis by Pavel Ilinov consists of three chapters, each corresponding to a separate paper. A joint topic of all chapters is information acquisition, using the methods developed in the rational inattention literature. This strand of literature, pioneered by Sims (2003), considers information to be a scarce resource. Therefore, an agent acquiring the information chooses optimally what he wants to learn, assuming that more information is more costly.

Chapter 1 is based on joint work with Ole Jann (CERGE-EI), which has already been published in *Economics Letters*. Chapter 2 is based on joint work with Andrei Matveenko (University of Mannheim), Maxim Senkov (CERGE-EI), and Egor Starkov (University of Copenhagen). Chapter 3 is single-authored.

In what follows, I will comment on each chapter separately.

### **Chapter 1. An Equivalence Between Rational Inattention Problems and Complete-Information Conformity Games**

This chapter analyzes the connection between a decision problem involving rational inattention and the behavior in a conformity game. On the one hand, the author considers a rationally inattentive decision maker facing uncertainty about the state of the world. Before choosing an action, the decision maker can acquire information subject to the entropy cost function. This is a standard setup known in the literature.

On the other hand, the author studies the conformity game. Such a game involves a continuum of fully informed agents of different types. Each type corresponds to a state of the world in the decision problem and the distribution of the types corresponds to the decision maker’s prior beliefs. In addition to a direct benefit from taking an action, each agent experiences costs of non-conformity, i.e., of deviating from the average behavior. This cost has a particular form and is measured by the Kullback-Leibler divergence.

The main result of the chapter (Proposition 2) provides an equivalence between the rationally inattentive behavior of an individual decision maker and the Nash equilibrium

of the conformity game. The formal argument is based on the result that Nash equilibrium maximizes the welfare of the conformity game (Proposition 1).

The chapter is quite brief in its arguments. I am aware that the paper has been published and that the briefness reflects the journal length requirements. Nevertheless, there are few points that I would like to have addressed. First, an essential technical property that is used in the proofs is the properness of entropy. It would be useful to elaborate more on this property and to include some additional references. Second, from the statement of Proposition 2 it is not clear, how “vice versa” should be understood. In particular, what are the quantifiers in the “vice versa” statement?

In addition, for future research it might be worth to establish a connection to potential games or to explore other games where the incentives to deviate for all players correspond to a maximization of a single function.

## **Chapter 2. Optimally Biased Expertise**

This chapter explores the principal-agent setup with misaligned beliefs. The main idea is that although the preferences of the principal and the agent are aligned, the principal might explore the difference in beliefs in order to induce more information acquisition. The principal can select an agent with appropriate beliefs and delegate to him the decision to take an action. Before doing so, the agent may acquire information, which is subject to the entropy cost function used in rational inattention models. This cost is, however, not internalized by the principal.

The author argues that it is optimal for the principal to select a more uncertain agent, who then in turn acquires more information. This effect dominates the potentially incorrect decision due to misalignment of beliefs.

As an important issue, I see the non-common prior. The author comments on this in footnote 9, p. 19. However, I think this issue deserves a more elaborate discussion than just a footnote. Although non-common prior indeed appears in the literature, it makes a difference if there are just two parties with different priors, or there is a continuum of agents each with a different prior. In particular, one might ask where do the priors come from. One way to think about the principal’s problem is that it provides an upper bound on what can be attained in a fixed principal-agent pair. For future research it might be also interesting to characterize the set of agent’s beliefs that lead to an improvement for the principal compared to common prior.

The author also studies several extensions and compares delegation under misaligned beliefs to other instruments from various strands of the literature. I think the comparison to the delegation literature (Section 2.6.3) is not really relevant. The delegation literature focuses on a particular class of preferences with continuous and linearly ordered states of the world. On the other hand, I find the extension with communication (Section 2.7.2)

indeed interesting and it may be a starting point for the next project.

A minor comment, it would be good to state clearly (in the texts of relevant propositions) which results are obtained under the assumption of state-matching preferences.

Overall, the chapter considers an interesting setup with novel arguments and results. If the issues are clarified, I am confident that the paper can be published in a good theory journal. For the sake of clarity, the author might consider to expel some of the extensions to make the paper more focused.

### **Chapter 3. Is it Better to be First? Search with Endogenous Information Acquisition**

This chapter studies the problem of selecting a candidate. The decision maker can learn sequentially about the quality of the candidates. Much like in the previous chapters, learning is costly, with decision maker being rationally inattentive. The author assumes that the costs of information acquisition are quadratic.

Because of costly learning, the amount of information acquired about the second candidate depends on the outcome of learning about the first one. The author argues that if the posterior about the first candidate is too low or too high, the decision maker prefers not to learn about the second candidate at all. Theorem 2 then provides a characterization of the optimal learning strategy. Interestingly, the optimal learning strategy is not unique. Nevertheless, the aggregate learning cost is constant and the candidates are selected with equal unconditional probabilities.

The author also discusses several extensions of the basic model, introducing asymmetry, discounting, an additional alternative, and a different cost function. Under the asymmetric candidates, better candidate is selected with a higher unconditional, however, the aggregate cost of learning remains constant.

Overall, the chapter studies an interesting variation on the well known candidate selection problem. However, I miss a clear punchline, which would be useful for a publication in a good journal. The author tries to establish a connection to psychology literature, but, the relation between remembering and learning is rather unclear.

In addition, the chapter should be improved in terms of writing. First, I think that the introduction needs some work. The author should state early and very clearly what question he studies and what are the main results. Second, it would be good to discuss the trade-offs faced by the decision maker after introducing the payoffs and the optimization problems in Section 3.2. Third, it is not clear why the author eliminates full learning. If it is not too demanding, it might be better to include it as a separate case and to present a complete analysis. Fourth, the statements of Corollaries 1 and 2 should be more self-contained and should be clear even without reading the preceding texts. For instance, it would help to clarify in the statement what is meant by “always”. Furthermore, does

the assumption on  $|\mu_1 - \mu_2|$  apply also in Corollary 2?

### **Global comments**

Before I proceed with the final evaluation, let me point out several minor global comments. First, it would be good to unify the abstract. Currently it just looks like three separate abstracts. Second, it would be good to unify labeling. While the equations include the chapter number, propositions are labeled continuously.

### **Final assessment**

The dissertation meets very high academic standards. All chapters develop novel theoretical models that represent contributions to the existing literature. While Chapter 1 has already been published, Chapters 2 and 3 have in my opinion potentials for good publications.

In particular, the dissertation satisfies formal and content requirements for a PhD thesis in economics. I would only like to point out that Chapters 1 and 2 are based on papers that involve co-authors. This is a common practice and, assuming that the internal rules of the institution are satisfied, I do not see it as problematic.

Overall, I recommend the dissertation for a defense.



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