

COLUMBIA UNIVERSITY
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ECONOMICS

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To the members of the PhD Review Committee

Please find attached my assessment of the thesis of Vladimir Novak.

The thesis consists of three papers. Arguably the most interesting is “The Status Quo and Beliefs Polarization of Inattentive Agents: Theory and Experiment” (which was also his job market paper). This is joint work with two other graduate students (one at CERGE and one at Columbia), but I know for a fact that Vladimir was absolutely central to the development of all of its aspects. It is, I think, and extremely interesting application of “rational inattention”, or the idea that people (i) have a limited capacity to pay attention and (ii) choose what information to gather optimally given the costs and benefits of doing so.

The paper explores the relationship between rational inattention and ‘belief polarization’, or the well-studied and potentially worrying phenomena by which the beliefs of different groups of people diverge over time. The central message of the paper is that rational inattention can naturally lead to belief polarization under certain circumstances.

The mechanism is, ex post very simple and can be explained in the following example. At least part of the genius of the paper is the uncovering of this underlying intuition. Consider the question of whether or not to adopt a new farm policy. There are three possible states of the world, in which the new policy could be good (g), moderate (m) or bad (b). Now consider two farmers. The first is doing rather well under the existing farm policy, and so only wishes to support the new policy if the state is g. The second is doing rather badly under the existing policy, and so wants to

support the new policy unless the state of the world is b. Further imagine that the state of the world is unknown each farmer, but they can choose between two signals, each of which is partially informative: G differentiates between {g} and {m,b} or B, which differentiates between {g,m} and {b}.

Which signal should each farmer choose? Note that for farmer 1 it is only instrumental to differentiate between {g} and {m,b}¹, so they should choose G. The equivalent logic says that farmer 2 should choose B. So where does the belief polarization come in? If in fact, the true state of the world is m, then farmer 1 learns only that it is either m or b, with farmer 2 learns only that it is either m or g. Thus, the farmer who was initially predisposed against the policy will update their beliefs downward, while the farmer who was more disposed towards the policy will update their beliefs upward.

The rest of the theoretical section of the paper essentially shows that this intuition extends far beyond the simple example. In fact, the second key observation is that, if there are only two actions to choose from, exactly the type of 'state pooling' that is imposed exogenously above will be optimal when the DM is allowed to choose whatever information structure they like with costs based on the mutual information between state and signal.² Because information is costly, the fact that there are two actions will mean the decision maker will generically choose to receive only two signals regardless of the number of states: one will tell them to choose the new policy and the other will tell them to stick with the status quo. And once this type of state pooling is established the logic of the example above leads to belief polarization.

The theoretical heart of the paper essentially demonstrates how this works in a set up where there is a choice between a status quo of known value, and a new option the value of which depends on which of N risky states obtains. In this set up, the

¹ I am deliberately abstracting from any strategic concerns here

² I would imagine that the intuition carries through to any case in which Blackwell more informative information structures are more expensive.

direction of belief updating in a given realized state is defined as the difference between the expected value of the risky option from the point of view of the decision maker (given the state that has occurred and the information structure they chose), and the ex ante expected value of the risky option. Using this definition Vladimir comes up with a clean definition of the states in which rational inattention will lead to belief polarization between different people, based on their prior beliefs and valuations of the status quo. Further interesting results characterize comparative statics of the model parameters (cost of information, value of the status quo) on the size of these effects.

I think that both the underlying insight and the execution of the theory section of the paper are really beautiful, and on their own would make a significant contribution. However, in addition the paper also contains an extremely interesting experimental section. The results here are rather new, and I think the three authors are still trying to figure out how best to organize them, but below is my take.

Essentially the reason to run an experiment is that, while the intuition and the maths is clear, there are a number of things that an actual person would have to 'do right' in order to generate belief polarization from rational inattention. Most obviously they have to choose the right type of information structure given their incentives, and they would have to update properly given the received information. We know from large previous literatures that subjects are unlikely to perform either of these tasks exactly in line with the theory. For example, subjects may have a preference for certainty, or place a non-instrumental value on information which would push them away from state pooling, or they may suffer from base rate neglect or other forms of mistakes in belief updating that push their posteriors away from those predicted by theory.

The aim of the experiment is therefore to understand whether rational inattention does indeed lead to belief polarization, and if not why not – i.e. which, if any, of these behavioral forces are strong enough to break the result. To design the most informative possible experiment, Vladimir 'breaks up' the tasks required for the

state pooling result into different experiments (e.g. choice of information structure, belief updating), and uses the result from each task to infer how much belief polarization would have occurred had the subjects done all stages at once. I think this is a sensible design choice, as it makes the results much more informative.

Broadly speaking the results are (i) that subjects do exhibit a preference for certainty, and on average overvalue information, but this is not enough to derail state pooling (ii) they update their beliefs surprisingly well (iii) as a result there would be a significant amount of belief polarization in the data. Thus the experimental results nicely complement the theory.

As I think I have made clear, I really like this paper: the underlying mechanism lies, I think in the sweet spot of what can be gleaned from rational inattention: not so obvious that one could have 'intuited' the effect without a model, but also not so baroque that it seems unlikely to reliably occur in real life. Further, I think the paper is a poster child for using an understanding of cognitive constraints to underpin behavioral economic phenomena. The fact that the results dovetail with experimental findings is the icing on the cake.

Vladimir's thesis contains two other chapters. The first, "A Note on Optimal Experimentation under Risk Aversion" (published in JET) makes a nice observation about behavior in the classic 'two armed bandit' problem, in which a DM must trade of 'exploring' for new information against 'exploitation' of resources that are currently known to be good. Vladimir and his co-author show that more risk averse decision makers can be prepared to take actions which are more risky in the short run because they reduce risk in the long run. The third chapter is "Estimating Models with Rational Inattentive Agents", is very exciting. Essentially, Vladimir has developed new techniques that allow models of rational inattention to be solved much more efficiently. This means that these models can be used in estimation, whereas previously they could typically only be used in calibration exercises (outside very specific cases). Armed with this new technology Vladimir has developed a model of rationally inattentive price setting firms which can, for the

first time be compared to existing models of firm behavior using traditional estimation techniques. This seems to me like an important technological breakthrough which will help move models of attention towards the mainstream.

Overall I think the three chapters make an excellent dissertation. I believe it satisfies the formal and content requirement for a PhD economics, and I recommend it for a defense.

Please contact me if I can be of further assistance.

Yours Sincerely

A handwritten signature in blue ink, appearing to read 'Mark Dean', followed by a long horizontal line extending to the right.

Mark Dean