

The Rational Expectations Hypothesis: Theoretical Critique

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Abstract: The rational expectations hypothesis as one of the building blocks of modern macroeconomic theory is analyzed critically in this paper. It is concluded that expectations may be rather backward-looking and adaptive since man does not search for all possible pieces of information and his learning by experience from previous mistakes may be imperfect and quite slow. Instead, mixed expectations are evaluated as a reasonable compromise.

Keywords: Expectations, rational expectations, adaptive expectations, mixed expectations, rationality, information, knowledge.

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Introduction

Methodological assumptions of the New Keynesian School and of the Real Business Cycle theorists are quite different, with one significant exception. Both schools share the assumption of rational expectations, which has been broadly accepted and gradually become one of the key elements of modern macroeconomic theory. Nevertheless, there are still some arguments disproving the rational expectations hypothesis.

This essay deals with these critical arguments against rational expectations. Several critical points of view are presented and examined, asking whether the rational expectations hypothesis is a realistic and reasonable assumption that may be used in macroeconomic models without oversimplifying the reality. Aim of this paper is to present theoretical discussion about the rational expectations hypothesis; nevertheless, there are numerous authors (e.g. Figlewski and Wachtel, 1981, Gramlich, 1983, Lovell, 1986 or Chow, 1989) whose empirical researches conclude rather against the rational expectations hypothesis.

We conclude that expectations might be rather backward-looking and adaptive since forward-looking expectations require more extensive set of knowledge and rational man demands only limited amount of pieces of information. Then, expectations are based on mostly recent development which is the same for all men in the population; they all use the same knowledge and, thus, their expectations may be on average biased in one direction. Since men learn from their previous mistakes, accuracy of their expectations might gradually increase in time. Nonetheless, expectations accurate enough are a general tendency, not a current state when expectations might be rather backward-looking. Furthermore, accuracy of aggregate expectations might even decrease in time due to population turnover since experienced men with accurate expectations die and young men does not have enough experience yet to form expectations accurate enough.

Instead of assuming rational expectations, using mixed expectations is suggested as reasonable approach to man's expectations. The idea is such that some fraction of the population forms rational expectations and expectations of the remaining fraction are adaptive. Accuracy of aggregate expectations is, hence, somewhere between these two extreme cases.

Structure of this essay is as follows. The first chapter briefly presents adaptive expectations and the rational expectations hypothesis. The second chapter discussed the rationality of human action in general. The next chapter presents a critique of the rational expectations hypothesis from the static view; the problem of information disposability and its consequences for expectations accuracy is discussed. The fourth chapter presents a critique from the dynamic view; alleged increasing accuracy of expectations due to learning by experience from previous mistakes is analyzed. The last chapter tries to find some compromise between adaptive and rational expectations.

1 The rational expectations hypothesis

One may distinguish two approaches to man's expectations. Firstly, adaptive expectations, introduced by Cagan (1956), may be defined as "*an approach that assumes that people form their expectation of a variable based on recently observed values of the variable*" (Mankiw, 2009, p. 575). Adaptive expectations are strictly backward-looking, given by extrapolation of recent development into the future and by correction of recent wrong expectations. An extreme version of adaptive expectations, static expectations, assumes that man expects no change in recent development and his expectations are simply given by the last value of the predicted variable.

Muth (1961) criticizes this approach and suggests an alternative, the rational expectations hypothesis, proposing that “*expectations (...) are essentially the same as the predictions of the relevant economic theory*” (Muth, 1961, p. 316). For purposes of this essay let us define the rational expectations hypothesis according to Mankiw (2009, p. 582) as “*an approach that assumes that people optimally use all available information – including information about current and prospective policies – to forecast the future*”. Thus, unlike adaptive expectations, rational expectations are a forward-looking approach. The rational expectations hypothesis was further developed in macroeconomic theory by Lucas (1972, 1976) and Sargent and Wallace (1975) and has been broadly accepted.

The rational expectations hypothesis, however, does not imply that every man anticipates the future development correctly. Any individual expectations may be wrong; since individual mistakes should not take place only in one direction, individual expectations should be distributed around the mean value of anticipated variable. Hence, expectations might be on average unbiased since individual mistakes should cancel each other out.

2 Rationality of human action

The rational expectations proponents (Muth, 1961 or Lucas, 1972) criticize lack of rationality of agents’ expectations in economic models. Nevertheless, terms “rationality” and “rational” may stand for the two different meanings that must be distinguished thoroughly; otherwise, the serious linguistic problem arises. Firstly, the term “rational expectations” may express the latter approach to expectations presented above; secondly, “rational expectations” might stand for not irrational behavior of man forming his expectations.

Non-distinguishing sufficiently these meanings would be fallacious. Regrettably, it seems that the rational expectations hypothesis proponents commit such error. It seems that they consider rational expectations as a rational behavior while adaptive expectations as an irrational behavior. Such idea is incorrect since adaptive expectations may be consistent with the rational behavior as well. Before justifying this statement in next chapters, let us focus in detail on human action rationality in general.

Mises (1998) argues that human action is necessarily always rational. Let us understand human action according to Mises as an act of a man with certain preferences who chooses means to achieve his goals; human action is intentional and purposeful behavior aiming to achieve man’s goals. If one should evaluate rationality of man’s action, either targets of action or selected means could be evaluated. Nevertheless, unbiased scientific evaluation of both is impossible.

Assessing man’s preferences and targets would violate the scientific principle of the value neutrality; a scientist cannot decide which targets are rational and which are not. Moreover, acting man’s preferences are known only to acting man himself. No one else may recognize his preferences without observing his action; his preferences are manifested only through his action (Mises, 1998). Hence, preferences and targets should be always considered as given and rational; term “irrational targets” is in this sense meaningless.

Evaluating of means chosen to achieve given goals is unfeasible as well without violating the principle of the value neutrality. One might try to evaluate whether chosen means are appropriate and leading to required targets; nonetheless, how might one examine this without knowing man’s targets? Only acting man himself may know his preferences; hence, only acting man himself may examine whether he chooses adequate means. No one else may examine rationality of his action; rationality must be *a priori* assumed.

Speaking about rationality of man's action, *ex ante* rationality is always meant. It may happen that acting man chooses means that prove to be *ex post* wrong, hence, *ex post* irrational. Man always chooses such means that he supposes to lead to his desired targets and his supposition may become *ex post* wrong. If he could repeat his action, he would now, obviously, choose different means. Nonetheless, no human action may be repeated; human action is always a singular non-repeatable event (Hoppe, 1997). For this reason, human action is always *ex ante* rational.

Some economists (Simon, 1991) speak of bounded rationality. That view, however, does not correspond to Mises' (1998) theory of human action. Every human action is decision-making under uncertainty and under emotions; these constraints are a common and unavoidable part of our world. Apparently, if acting man were not constrained anyhow, his action could be different. Nevertheless, man must act somehow since even doing nothing and waiting for more suitable conditions for decision-making is a special kind of human action aiming at certain targets. Thus, action of man even under uncertainty or emotions is always *ex ante* rational.

To sum up previous discussion about rationality of human action, acting man always chooses such means that he assumes to fulfill his targets. Only an acting man can evaluate rationality of his action. Since human action is always rational, it does not make sense to speak about "irrational behavior" or about "lack of rationality".

3 Critique: Static view

After introducing the theoretical background in the previous chapter, we may proceed to the critical analysis of the rational expectations hypothesis. Mankiw (2009) explaining the rational expectations hypothesis states that man uses all available information. Nonetheless, he does not offer any further explanation of what "all available information" means. Since Muth (1961) claims that rational expectations should give the same predictions as the economic theory, one might assume that man should actively search for all possible pieces of information that could be useful for his expectations-making.

Information is, however, not a public good available for free. Since all pieces of information are a scarce good, some costs, at least opportunity costs of time, need to be spent to obtain it. Downs (1957) and Stigler (1961) further argues that since gathering the information is costly, it is not optimal behavior to search for all pieces of information. Rather, the rational agent compares marginal costs of additional piece of information and its marginal benefits and demands it unless its marginal benefit exceeds its marginal cost.

Nevertheless, it seems the rational expectations hypothesis assumes costless information (Basse, 2006). If this statement were justified, man would ask for every piece of information and would use it to make his expectations more accurate. In such case, man's expectations could be the same as predictions of the relevant economic theory. This assumption is, however, not realistic. There is no piece of information available for free in our world; as explained above, even if there were no money costs of information, there would be opportunity costs of time necessary to obtain it.

Decision-making of man is, then, based on imperfect knowledge which, nevertheless, represents his optimal demand for information. Searching for more pieces of information to possess "all available information" would not be optimal behavior for him. Thus, it is not a reasonable assumption to suppose that agents use all available information since the information is never "available" or "given"; any piece of information may be obtained only

after spending some costs. The extent of information used when making expectations depends, therefore, on costs and benefits of information.

One might object that the assumption of searching for all information does not mean that each man search for all pieces of information. Such objection would be certainly convenient. Each man has better knowledge in different fields and better access to different pieces of information. Then, it is possible for men to share their knowledge with one another, which might extend knowledge of all of them. Nonetheless, this act of knowledge-sharing bears some costs, at least opportunity costs of time, for both involved parties. Thus, man sharing his knowledge might have no incentive to pay costs of it and man obtaining his knowledge might have no incentive to pay these costs as well. Apparently, costs of sharing all pieces of information would be prohibitively high; men would rather prefer imperfect knowledge.

Stigler's idea of the economics of information is, however, criticized by Kirzner (1997) who asks how agents can know costs and benefits of the information and calculate rationally their optimal demand for information. If man did not know these costs and benefits, he could not calculate whether additional piece of information is worth paying.

Nevertheless, such argument may be easily disproved. Current world does not constitute the situation of complete certainty and almost all human action is decision-making under uncertainty (Hoppe, 1997). Man forming expectations, regardless whether backward-looking or forward-looking, makes expectations and estimations about all relevant data, including costs and benefits of additional pieces of information. Optimal extent of knowledge is, then, based on comparison of expected costs of additional piece of information with its expected benefits; additional piece of information is demanded only if its expected benefit exceeds its expected costs. This comparison is always *ex ante* rational for reasons explained in the second chapter.

Moreover, rational man knows that demanding additional pieces of information implies paying some non-zero costs. He need not know these costs exactly, but he certainly knows that some costs of information exist and he certainly does not demand all pieces of information. His demand for information might be different from his demand if he knew costs and benefits exactly, but that is not important for our purposes. Man's expectations-making is always based on imperfect knowledge, regardless Kirzner's (1997) critique.

Beside the impossibility of costless information, there is another argument disproving that man may use all information when making his expectations. An idea presented by Hayek (1945) and further elaborated by Boettke (1997) refers to the nature of the information itself. Hayek (1945) explains that the information always exists in the form of pieces of incomplete knowledge dispersed among all men in the economy. Information does not exist in an integrated form and can never be concentrated in one time and place; contrarily, any piece of information is available only to very limited group of men in limited time and place. Thus, according to this argument, even if the gathering of information were completely costless, man could not use all information since information is never given to him in its totality, but is rather dispersed between all men in the economy. Since man cannot use all available information, his decision-making and expectations-forming is based upon imperfect knowledge.

Furthermore, even if we accepted that all pieces of information are costless and are disposable to man at one time and place, it could not be ensured that man would be able to use all these pieces of information. The extent of his knowledge would be very large and man could not be able to process it all because of cognitive limitations of his mind (Tversky and Kahneman, 1986 or Rubinstein, 1998). Hence, man does not use all information available to him and chooses only those pieces of information that he finds the most important. The fact that man does not use all information is, however, an intentional and fully rational behavior.

Three complementary reasons why man does not and cannot use all information when making his expectations were presented. All these theories imply that man acts upon incomplete knowledge. It is obvious that forward-looking expectations require more extensive set of knowledge than backward-looking approach; especially current and prospective policies monitoring and studying relevant economic theories might be considerably costly. Hence, man apparently does not search for all possible information and his expectations might be backward-looking rather than forward-looking.

If expectations are based mostly on recent development and recent experience and not on current information, all men in the economy rely on similar set of information during their expectations-forming. Then, it is likely that individual mistakes cannot cancel each other out and that expectations may be on average biased in one direction. This conclusion violates basic characteristic of the rational expectations hypothesis presented in the first chapter; hence, expectations should be considered rather as adaptive and backward-looking than rational and forward-looking.

4 Critique: Dynamic view

We have showed that man does not search for all possible pieces of information. One could, however, object that rational man realizes his previous faults, learns relevant economic theory and follows men with more accurate expectations, which would imply his gradual shift from backward-looking to forward-looking expectations. Let us focus on this objection.

Obviously, it is rational for man to aim at improving accuracy of his expectations by learning from his previous experience and by correcting his previous mistakes. Rational man realizes his previous mistakes and might learn relevant economic theory after recognizing his faults; forward-looking expectations, however, represent a state to which man's expectations gradually approach, not a current state. Expectations which are the same as the predictions of the relevant economic theory constitute only general tendency of man's expectations; man's expectations might become more and more correct in time (Hayek, 1949). Some men's expectations may be accurate enough, but beside these men, there is a lot of men whose expectations are not yet accurate enough. Furthermore, gradual shift towards forward-looking expectations might be quite sluggish since even following those with more accurate expectations is costly and man may rather prefer less accurate expectations and lower costs of monitoring and following strategies of the others.

Moreover, even the existence of the state in which expectations of all men are forward-looking is not warranted since population is not constant over the time. Some men, apparently those more experienced with more accurate expectations, die, which decreases overall accuracy of expectations. More precisely, man may lose the ability to form accurate expectations even during his life when he gets old, but we may neglect this effect. Simultaneously, some men are born; these men do not probably have enough knowledge and experience yet, thus, their expectations might not be accurate enough. Hence, population turnover prevents overall accuracy of expectations from rising continually. Whether expectations become on average more accurate depends on whether decrease due to population turnover is compensated by increase due to learning by experience from previous mistakes.

Situation might be different when considering expectations of entrepreneurs. Those entering the market might be like born men since they are not experienced enough and their expectations might not be accurate; nonetheless, accuracy of expectations of those leaving the market is different. Profit maximization motivates entrepreneurs to try to expect the future conditions correctly; economic profit of an entrepreneur making incorrect expectations is lower than profit

of those anticipating the future correctly. In the long term, entrepreneurs with low or negative profit leave the market, which should increase overall accuracy of entrepreneurs' expectations. Thus, expectations of the entrepreneurs might be more accurate due to the threat of leaving the market. On the other hand, even if rational man tries to increase the accuracy of his expectations, he cannot leave the market even if his expectations are completely wrong.

One might even challenge the fact that expectations of a man might become more accurate by learning from his previous mistakes. Hoppe (1997) states all the man's action is constituted by singular, independent and non-repeatable events; hence, events that man tries to anticipate are necessarily different from those previously experienced. In such case, man cannot improve perfectly accuracy of his expectations by using his previous experience. Man learning by his experience might, hopefully, learn the direction of changes, but not their intensity, which could be recognized only by studying economic theory and observing current economic policy. It is possible that because of previous mistakes, man realizes he needs more pieces of information for his expectations-making and is willing to pay costs for them. Nevertheless, as was explained in the third chapter, he is never willing to pay costs of all pieces of information.

5 Suggestion of adaptive and rational expectations synthesis

Accepting several arguments against the rational expectations hypothesis and concluding that expectations might not be treated as fully forward-looking does necessarily mean that expectations might be treated as simply adaptive. Some arguments of those advocating the rational expectations hypothesis (Muth, 1961 or Lucas, 1972) against adaptive expectations are relevant and should be considered. Thus, expectations might be treated as neither adaptive nor rational; one might try to find innovative approach to man's expectations that would somehow synthesize backward-looking and forward-looking approach.

As was stated in the previous chapters, man apparently does not search for all information to forecast the future correctly. Nevertheless, his expectations might not be strictly backward-looking; depending on costs and benefits, he might use some pieces of information about the state of the economy, economic policy and economic theory to increase accuracy of his expectations. The extent of information used when forming expectations apparently differs among all men in the population. There are men with easy access to relevant information or men to whom additional pieces of information bear high benefits; these men might be well-informed and their expectations might be sufficiently accurate and, hence, classified as forward-looking. Beside these men, there are those with worse accessibility of information or those with lower benefits of additional pieces of information; these men rationally choose not to be informed sufficiently to form forward-looking expectations; their expectations might be rather classified as backward-looking. Furthermore, one might consider third type of men whose expectations are completely random.

The entire population is somehow distributed between two extreme cases represented by perfectly forward-looking and strictly backward-looking expectations; for simplicity, let us neglect those with random expectations. Hence, aggregate accuracy of expectations is somewhere between those of forward-looking and those of strictly backward-looking expectations. Assuming strictly rational expectations in such case would be fallacious.

Instead, mixed expectations used in some New Keynesian School models (e.g. Romer, 2006) seems to be a satisfactory solution. Some fraction of the population forms forward-looking (rational) expectations and the other fraction forms strictly backward-looking (adaptive) expectations; on aggregate level, accuracy of expectations would be lower than accuracy of

fully forward-looking expectations, but higher than accuracy of fully backward-looking expectations, which is in accordance with the previous theoretical discussion.

Whether aggregate expectations are closer to rational or adaptive expectations depends on the population structure, or, more precisely, on division of population between rational expectations-makers and adaptive-expectations makers. Such ratio cannot be determined theoretically; it is an empirical question which should be answered by further empirical research.

6 Conclusion

This essay critically examined the rational expectations hypothesis as one of the building blocks of modern macroeconomic theory. The objective was to assess whether this assumption is convenient or not, concluding that the rational expectations hypothesis is quite a strong and unrealistic assumption.

The rational expectations hypothesis seems to imply that adaptive expectations are linked to irrational behavior while rational expectations are consistent with rational behavior. This is, however, not true; as was explained in this essay, human action is necessarily always rational. Proponents of the rational expectations hypothesis unfortunately misused the term “rational” and hereby caused serious linguistic problem.

Three complementary reasons why it is not rational for man to search for all possible information were presented; rational man prefers incomplete knowledge and his expectations are rather backward-looking since these expectations require less extensive set of information than forward-looking expectations. Since recent development used as a guide for expectations is the same for all men in the economy, they all rely on same set of information during their expectations forming. Then, their expectations may be on average biased since individual mistakes might take place in only one direction.

Rational man may learn by experience from his previous mistakes, which may increase accuracy of his expectations. This, however, does not mean his expectations are accurate enough; accurate expectations are only general tendency to which his expectations approach. Furthermore, on aggregate level, accuracy of expectations may even decrease in time since experienced men with accurate expectations die and expectations of younger men are less accurate as these men are less experienced.

We have, thus, concluded that treating expectations as forward-looking and rational is not convenient. Although there might be some men whose expectations are perfectly forward-looking, there are a lot of men with rather backward-looking expectations. Instead, using mixed expectations was evaluated as a reasonable solution; some fraction of population forms rational expectations and those of the other men are adaptive. Further research is, however, necessary in this issue, together with further introduction of mixed expectations to macroeconomic models.

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