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Objections and suggestions still welcome!

Markets vs. Government when Rationality is Unequally Bounded: Some Consequences of Cognitive Inequalities for Theory and Policy

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Abstract: Recognizing that human rationality has bounds that are unequal across individuals entails treating it as a special scarce resource, tied to individuals and used for deciding on its own uses. This causes a meta-mathematical difficulty to the axiomatic theories of human capital and resource allocation, and raises a new problem for comparative institutional analysis, allowing it to explain some so far little understood differences between markets and government. The policy implications strengthen the case against national planning, selective industrial policies, and government ownership of enterprises, but weaken the case against paternalism.

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Most economic theories have so far been based on the idealizing assumption that all economic agents are perfectly rational, able to find optimal solutions to all their problems, however difficult. Since the pioneering work by Simon (1955), however, dissent has been growing, using theoretical arguments and empirical evidence to demonstrate that far from that perfect, human rationality is significantly bounded.¹

But most of this dissent has been about the rationality bounds of one typical human mind, without considering their possible individual differences. This is only the step from assuming everyone's rationality equally perfect to assuming it equally bounded. This paper takes one more step: it recognizes that human rationality is not only bounded, but moreover unequally so. Whether the inequalities stem from inborn talents ("nature") or from education and experience ("nurture"), the fact simply is that the rationality of some individuals is bounded more, or differently, than the rationality of others.

The purpose of this paper is to examine what this fact implies for theory and policy, with particular attention to the long-standing markets vs. government issue. The ultimate objective is to discover some so far little-noted merits and demerits of the two, which could help to answer the basic policy question of how the performance of an economy could, and how it could not, be improved, in terms of given success criteria, by public policies.

The paper is organized as follows. Section I defines and clarifies the notion of unequally bounded rationality. Section II brings to light the meta-matematical difficulties that this notion causes to axiomatic economics, in particular to the theories of human capital and resource-allocation theory, and states the new problem that it raises for comparative institutional analysis. Section III develops a logical analysis of this problem, illustrated by a simple mathematical model, to compare the treatment of unequally bounded rationality by markets with that by government. Section IV infers policy implications. Section V presents concluding comments.

I. Unequally Bounded Rationality

The definitions of "rationality" that can be found in economic literature fall into two classes: the purely formal, or tautological ones, and the empirically meaningful ones, which

¹ The bounded vs. unbounded rationality debate is now extremely rich and ramified, which makes it difficult to refer to it in any systematic way. In addition to Simon (1955, 1978, 2000), my main references are Alchian (1950), Friedman (1953), Winter (1971), Sugden (1991), Kahneman and Tversky (2000), and Vanberg (2002, 2004).

link rationality to actual cognitive abilities (competencies, “intelligence”) of human brains.² Only the latter makes it possible to recognize that rationality bounds are individually unequal, and indeed to admit that human rationality has bounds at all. The present definition must therefore be of this class.³

DEFINITION 1. “Rationality” means the cognitive abilities of human brains for solving economic problems – that is, problems of how best to use given resources under given constraints for the pursuit of given objectives (preferences, objective function). It can exist in different varieties, relevant to different kinds of economic problems – e.g., involving different types of resources, different time horizons, or different degrees of risk or uncertainty. An individual’s rationality is bounded if there are economic problems for which he or she is unable to find an optimal solution.⁴

“Rationality” thus means only a subset of the human cognitive abilities that may be considered to belong to human rationality in a more general sense. But this subset is very special to economists. It is what most of their rationality debate has been about, and it also perfection of at least some of these abilities that most of their theories need to assume. Note that this even includes the theories of procedural rationality and rational irrationality: while they admit bounded rationality for certain economic problems, they assume perfect rationality for the higher-level economic problem of how best to use the bounded rationality. In contrast, no such perfection is assumed here.

ASSUMPTION 1. Rationality of all varieties and all levels is both bounded and individually unequal. For the sake of brevity, an individual whose rationality (relevant to a certain type of economic problems) is less bounded than the rationality of another individual

² The two categories closely correspond to the distinction between the non-refutable rationality principle and refutable rationality hypotheses used by Vanberg (2004).

³ Note why the purely formal definitions of rationality are unsuitable – not only here, but for all economic problems involving more than one person. Their aim is to save the assumption of perfect (unbounded) rationality even for an individual blatantly unable to find the right solutions to his economic problems. To make it possible to say that even such an individual maximizes his objective function under his constraints, these definitions include among these constraints also the ones on his or her maximization abilities (see, e.g., Boland, 1981). Everyone can then indeed be said to be “perfectly rational” in the tautological sense of doing *his* or *her* best, however severe these constraints might be. But to say so may be harmless only for one-person problems. When several individuals are involved – which includes all policy issues – everyone can of course still be said to do his or her best, but this obscures the crucial fact that for the same objective function, the “best” of some individuals may be much better, or much worse, than the “best” of others.

⁴ As bounded rationality is sometimes confused with imperfect information about the state of the world, note that the two are here sharply distinguished: rationality only means the personal cognitive abilities to find, understand and use such information, but not the information itself. It is in the exploiting of the same imperfect information that some of the most important rationality differences come to light.

will be said to be (for these problems) “more rational,” and his rationality to be “higher.”

Unequally bounded rationality raises the problem of its measuring. In principle, it could be measured by marking, in the entire set of the differently difficult problems that the agents of an economy might encounter, the subset of the sufficiently easy ones for which a given individual is able to find an optimal solution; or by estimating, for different problems of the entire set, the relative losses caused by the errors that the individual would likely commit if assigned to the task of solving them.

In practice, however, its measuring is limited to artificial experiments, intelligence tests, and problems in economic textbooks, which cannot yield more than rough and often insufficient indications. For many real-world economic problems, especially the most complex ones, the relevant rationality cannot be objectively measured at all. It can only be subjectively estimated, with the risk of committing more or less large errors. These errors depend on the rationality of the estimating individuals: the more bounded this rationality, the larger the errors will likely be. Importantly, this also includes the cases when individuals estimate their own rationality: those suffering from severe rationality bounds are likely to commit large errors also in such estimations, as they are typically unaware of how severe these bounds really are.⁵ This raises the question of recognizing rationality by rationality (RRR), which appears plausible to answer, in a first verbal approximation, as follows.

ASSUMPTION 2 (“RRR-ASSUMPTION”). When estimating the rationality of others, individuals safely recognize those whose rationality is lower than theirs, but are unable fully to appreciate the possibly subtle differences between their rationality and all the higher rationality, and may moreover have irrelevant prejudices that make them underestimate the rationality of a more or less large subset of such equally or more rational individuals. They may count in this subset themselves, if their prejudices include an inferiority complex.

It is sometimes important to consider that rationality can be improved by learning. Then, however, it is also important to consider that all learning requires pre-existing learning abilities, which limit what their owner can possibly learn in the most ideal learning environments. Note that this requirement is also valid for all meta-learning – the learning to learn – which requires corresponding meta-learning abilities. A simple recursive reasoning suffices to infer that all learning, regardless of the number of its meta-levels, must unfold

⁵ In addition to casual observations of (and frequent irritation with) such individuals during personal encounters, their existence is now solidly documented in experimental psychology by Kruger and Dunning (1999), in their wittily titled article “Unskilled and unaware of it: how difficulties in recognizing one's own incompetence lead to inflated self-assessment.” This evidence devalues all the standard models of allocation of abilities, including talents, that stand and fall with the assumption that all agents perfectly know the abilities of themselves.

from, and be ultimately limited by, some inborn learning abilities – commonly called “talents” – which must also be included among the cognitive abilities that may, and usually also do, differ across individuals. This makes it necessary to split the rationality of each individual into at least two components: *actual rationality*, which may vary over time by learning; and *potential rationality* or *talents*, which may in a first approximation be considered constant.⁶

Here, however, rationality learning may often be omitted, as this omission does not help the present argument, but rather works against it. Namely, taking rationality learning into account, far from weakening its assumptions, can only make them stronger. Differences in talents imply that even when rationality is considered improvable by learning, it must nevertheless be recognized ultimately bounded, with different bounds for different individuals.⁷ And the possibilities of learning increase the difficulty of estimating an individual’s rationality, and thus also the importance of the rationality for estimating it. As is well known in economic praxis, talents often matter more and are always more difficult to estimate than actual rationality: recognizing talents requires talents.

II. Consequences for Economic Theories

Recognizing that rationality has individually unequal bounds entails including it among scarce resources: individuals possess it in different quantities and qualities, and both their personal achievements and the performance of the entire economy depend on its uses. But being both a scarce resource and the ability needed for deciding on the uses of scarce resources implies that it is needed for deciding on its own uses. This implication causes a meta-mathematical difficulty to all axiomatic economics, and raises a new problem for comparative institutional analysis. It can be regarded as a cousin to the Russel Paradox, which destroyed much of Kantor’s original set theory, and to the Gödel Theorem, which proves that no axiom-based theory can be both consistent and complete. Axiomatic economics cannot indeed be complete in the sense that it can consistently deal with nearly all

⁶ A deeper study of human cognitive abilities would moreover have to consider that learning is a path-dependent process during which some of the initially given talents may be neglected and lost, or even purposefully blocked – e.g., by ideological or religious “brain-washing”. This would make it necessary further to distinguish the constant inborn talents from the actual state of learning abilities, which vary over time in function of the entire series of past inputs by which the inborn talents have been developed, or neglected, or blocked.

⁷ Note that contrary to the wishful popular belief, learning is no reliable way of decreasing cognitive inequalities. Because of individual differences in talents, it may on the contrary increase them. The only way to decrease them is hindering the more talented individuals from learning more than the less talented ones, which would cause (and in some countries appears actually to cause) enormous social losses.

kinds of scarcities, but just not with that of rationality. Considering this implication for the standard theories of human capital and resource allocation can convey the main idea.⁸

A. *Human Capital Theory*

In the standard classification of scarce resources, rationality is clearly a kind of human capital. Like all the usual varieties of this capital, it is tied to individuals, who cannot obtain it by direct communication, but can only improve it by own learning from costly education and experience. The key economic problem is thus the same: how much to invest in this learning?

But human capital theory, instead of finding the solution, leads to a paradox. As it is built on the perfect rationality assumption, it is limited to individuals who *optimally* invest in improving their currently imperfect human capital, given all the relevant costs and benefits of such investments over time. This allows it to be logically consistent for *nearly* all varieties of human capital, but just not for rationality. The trouble is that this variety is precisely the one needed for all investment decisions, including those on investing in human capital. Thus, a little-rational investor who wants to optimize his investment in improving his rationality *now* may need much of the improved rationality that he is only considering to acquire *in the future* – for instance, by studying human capital theory.

To regard bounded rationality as a kind of human capital is nevertheless instructive. This makes it clear that in spite of its special status in economics, it is only one among many kinds of human abilities and talents, with which individuals may be differently endowed. Moreover, as often appears to be the case, the different kinds may be far from correlated – for instance, highly talented sportsmen rarely appear to be highly talented musicians and both rarely appear to be highly talented (rational) investors. To see that the talent for becoming a highly rational economic agent is only one among many other human talents is useful for not overestimating its value. On the other hand, however, economic analysis of the allocation of talents, not to be misleading, cannot ignore how special (“singular”) this talent is: it is needed for recognizing the value of *all* talents (including itself), investing in their development, and putting them to social uses.⁹

⁸ A good intuitive insight into the meaning of the Gödel Theorem can be obtained from the Pulitzer Prize winning book by Hofstadter (1979).

⁹ Note that this puts in doubt all the standard models of allocation of talents, in which this special position of talents for economic decision-making is not recognized. A clear example is their prototype in Murphy, Shleifer and Vishny (1991) with the remarkable conclusion that using talents in engineering is more productive than using them in investment speculation. This conclusion misses the crucial point that engineers must know which

B. *Resource-Allocation Theory*

In addition to conflicting with the perfect rationality assumption, unequally bounded rationality disturbs standard resource-allocation theory by destroying the conceptual barrier between the sphere of agents and the sphere of resources, which the theory needs to separate rationality from scarcity. The agents, assumed to keep their initially given positions, use their assumedly abundant rationality for conducting economic calculus and deciding on the allocation of the scarce resources, while the resources move around and are allocated to different uses as a result of the agents' decisions. Intuitively, one may think of the difference between the players of a game of cards and the cards. The theory needs this barrier to proceed in an orderly fashion from the decisions of agents to the allocation of resources.

Unequally bounded rationality admits no such barrier. It spreads into the sphere of scarce resources, where its differently bounded individual endowments pose the problem of their allocation to efficient uses, while scarcity spreads into the sphere of agents, as agents endowed with differently bounded rationality are differently scarce. As a consequence, the agents may not be able to keep their positions. Rationality allocation may have to move them to different uses, much like any other scarce resource. In the intuitive comparison with a game of cards, this is as if the players became themselves cards of different values and were included among the cards with which they play.

To grasp the unusual features of this situation, consider two usual questions: (1) What properties must rationality allocation have to be efficient? (2) Starting from an inefficient state, what processes can make it approach efficiency?

To deal with question (1), it appears necessary to view the economy as a network of differently difficult decision tasks (positions), forming a certain configuration of markets and organizations, to which its differently rational individuals are assigned (allocated, selected for). Rationality allocation works through the designing and redesigning of these positions, and through their assigning and reassigning to different individuals. The entire network is thus being formed and reformed – for instance, by creating, growing, restructuring or liquidating firms, and by opening, developing, or closing markets.

A similar view is used in the literature on markets and organizations following

of their many technically feasible projects are also economically sound, and that speculation on financial markets is an essential ingredient of what will be shown below to be the best feasible ways of finding this out.

Williamson (1975). But the difference is that this literature only studies the *general forms* of the two, whereas analysis of rationality allocation must enter into the *methodologically individualistic details* of how the differently difficult positions within these forms are designed and assigned to differently rational individuals by differently rational individuals. As clarified below, this entering into individualistic details is important for comprehending what is well known in business practice, but what studies of general organizational forms cannot capture – that a few key individuals can cause enormous performance differences among organizations of the same form.

In such a possibly changing network, an efficient rationality allocation can roughly be described as avoiding the two opposite inefficiencies: assigning some highly rational individuals to too easy positions, and thus wasting their scarce high rationality; and selecting insufficiently rational individuals for too difficult positions – or, in Heiner's (1983) words, creating competence-difficulty gaps – and thus wasting resources because of the errors that these individuals are bound to cause.

In question (2), the main problem is that unequally rational individuals generate less thrust for moving from less efficient to more efficient allocations than the perfectly rational agents of standard theory, who always see and exploit all opportunities for efficiency-increasing transactions. In some inefficient rationality allocations the thrust may be zero, so that the inefficiency is perpetuated, or even negative, so that it will grow. This can happen if the rationality relevant to gaining positions is not closely correlated with the one relevant to functioning in them. Individuals of low relevant rationality can then gain and retain key positions from which they can keep misallocating the higher rationality of other agents.¹⁰

Even in the best case, rationality allocation cannot be expected to move towards efficiency straightforwardly. Because of the more or less bounded rationality of the individuals who run it, it cannot avoid blind alleys that end in more or less costly errors, and thus also cause more or less long detours. It can therefore approach efficiency only by a trial-and-error evolutionary process, of which the best-known example is the Darwinian evolution of life by random mutations and natural selection.¹¹

¹⁰ Insider observations of the late socialist economies of the Central and Eastern Europe suggest that such misallocations were among the main reasons why these economies were bound to collapse. For an excellent satirical description of a similar situation in a large private firm, see, in the classical book by Parkinson (1956), the chapter on "Injelitis" – an organizational disease caused by a combination of incompetence and jealousy that gets hold of the top management. For reasons discussed below, similar situations are both more likely to occur and longer to last in government organizations.

¹¹ Such processes are studied in evolutionary economics, with the classical contributions by Schumpeter (1934, 1942), Alchian (1950), Winter (1971), and Nelson and Winter (1982).

Such a process can be anatomized into series of two types of stages: (A) generating imperfectly informed (in the Darwinian case entirely random) “trials” (experiments, innovations, mutations); and (B) testing and sorting the generated trials into “errors,” forced to be corrected or eliminated, and “successes,” selected for a more or less lasting preservation.

In rationality allocation, as follows from the answer to question (1), the main trials consist of tentative designs of differently difficult decision tasks (positions), and tentative assignments (allocations) of the tasks designed to agents of differently bounded rationality, *including* tentative designs and tentative assignments of the tasks of task-designing and task-assigning. Such trials can indeed be seen as the basic steps of which the creation, restructuring, and expansion or shrinking, of markets and organizations are made. They can then be more or less relevantly tested, and their errors more or less sharply and more or less rapidly disclosed, by market competition, or government decisions, or a mix of both.¹²

Any process that can unfold in several differently advantageous ways raises the problem of its control: how to guide (shape) it, to make it unfold as advantageously as possible? The difficulty is that standard control theory, which solves control problems by assuming a specific controlling agent and determining his optimal conduct is here of little use. Namely, it cannot be known in advance which of the economy’s agents, if any, would be so highly rational as to be able to control this process reasonably well, let alone optimally. This leaves only one possibility: if the control cannot be entrusted to any a priori chosen person(s), its tools must be sought among impersonal institutions in the modern sense of rules-constraints (“rules of the game”), consisting of formal laws and informal social norms.¹³

C. *Comparative Institutional Analysis*

Institutions in this sense are studied in the rapidly expanding field of new institutional economics, including property rights theory, law and economics, and constitutional economics. So far, however, rationality has been assumed there either equally perfect or equally bounded,

¹² In this context, the term “error” means an actually tried rationality allocation that is, or a new discovery causes it to be, wasteful (inefficient), causing actual and/or opportunity losses. Using this term helps to keep in mind the common “trial-and-error” logic of all evolutionary processes.

¹³ As explained with particular clarity by North (1990), defining “institutions” as rules of the game and distinguishing them sharply from “organizations” as collectives of agents playing the game is a necessary step for putting institutional economics on a solid conceptual basis. As long as the two logically disparate concepts are mixed – which is what the word “institutions” does in most natural languages and in the old institutional economics – no clear institutional analysis is possible.

and its analysis has mostly been non-evolutionary, concentrating on the effects of institutions on incentives (often mainly transaction costs), and static efficiency.¹⁴ To deal with the evolutionary process of rationality allocation, it needs to expand more.

The effects of institutions that also need to be taken into account may suitably be called “evolutionary,” and classified, following the above anatomy of evolutionary processes, into effects A, shaping the generation of trials, and effects B, shaping the elimination of errors. Effects A include the shaping by different forms of property rights of the freedom of enterprise, of the positive and negative incentives for using this freedom, and of the access of entrepreneurs to capital. Effects B include the shaping by different forms of bankruptcy law of the restructuring, the shrinking, and the closing down of enterprises.

A small but interesting increase of the powers of comparative institutional analysis immediately follows. Some important, but previously little noted merits and demerits of alternative institutions can be disclosed by simply comparing them for effects A, the variety of the trials that they allow and encourage to be generated, and for effects B, the precision and the speed with which they force the errors committed to be eliminated. As it is advantageous not to miss highly successful trials, some of which may be very rare, nor to leave wasteful errors uncorrected for a long time, it is possible to conclude, subject to certain qualifications, that institutions X are superior to institutions Y if they allow and encourage a greater variety of trials and enforce a sharper and faster elimination of errors.¹⁵

To link these effects to rationality allocation, it is necessary to consider the individuals by whom the generation of trials and the elimination of errors are run, and the ways in which different institutions shape their selection and the design of their positions. While the availability of relevant information is always limited, so that many trials can never avoid to be

¹⁴ To be precise, both limitations of human cognition and evolutionary processes are there attracting growing attention, recently in North (2005) and Eggertsson (2005). But this attention appears limited to the evolution of institutions themselves, leaving aside the present problem of how markets and organizations evolve and how rationality is consequently allocated under different given institutions. Both these authors assume this problem to be unsolved, with the implication that different political actors, depending on their cognitive limitations, may have more or less mistaken mental models of it, which is one of the reasons why institutions may evolve towards, or remain blocked in, more or less imperfect states. Somewhat surprisingly, institutional analysis is little used in search of its solution, which could allow the political actors to improve their mental models by replacing their divergent ideological beliefs – e.g., about the merits and demerits of different forms of ownership of firms, freedom of enterprise, and government social and industrial policies – by definite analytical results.

¹⁵ Applications of this simple analysis are in Pelikan (1988, 1992). They proved to be more informative about the weaknesses of different forms of socialism and the then widely admired Japanese industrial policies than the more complex mathematical models of that time, which were on the contrary proving that both could be optimal. That a simple analysis may be more informative than an artificially complex one is also illustrated by the well-known findings of a strong correlation between economic freedom and growth (for their survey, see Berggren, 2003), which compares institutions only for a subset of effects A.

errors, the trials have more chance to succeed, and the relatively fewer errors have more chance to be rapidly discovered and eliminated, if the generation of trials and the elimination of errors are assigned to individuals with higher relevant rationality rather than lower – for such individuals are better at discovering and using whatever limited information might be available – and if these positions are not allowed to grow more difficult than what the rationality of the individuals selected for them can reasonably handle.

To be sure, following all the differently rational individuals in an economy in their differently demanding and possibly changing positions is hardly feasible. But fortunately, analysis can be simplified, without loss of relevance, in three ways.

SIMPLIFICATION 1. Attention can be narrowed to a subset of key positions.¹⁶ Within each organization – be it a private firm, a cooperative, or a government agency – the internal rationality allocation can be put on the account of the rationality allocated to a few top positions. Comparative analysis of institutions of economies can consequently consider only these top positions, leaving the inside rationality allocation to organizational theories.

For comparative purposes, it suffices to consider only two suitably defined top positions – *owners* and *entrepreneurs* – provided they are defined with enough generality to make them appear at the top of all the different organizations of an economy.

DEFINITION 2. The owners supply organizations with the capital that the organizations need to form, function, and grow up to a certain size. The entrepreneurs supply organizations with projects for both the external activities and the internal form, and make the first moves from which the realization of these projects unfolds.¹⁷

Managers are situated just below these tops. They lead the functioning of already formed organizations, but are subordinate to entrepreneurs during the forming (organizing, reforming) of these organizations – when the internal rationality allocation takes place. It is the latter who design and assign their positions, including their rights to design and assign other positions, and including the limits within which they may modify their own position.

¹⁶ That “a handful of heroes” may be crucial for the success of large collectives is nicely shown, in the context of economic reforms, by Harberger (1993). In the context of rationality allocation, the crucial “heroes” are likely more than handful, but they still constitute only a limited subset of all individuals.

¹⁷ As the term “entrepreneur” still lacks a generally accepted precise definition, I am taking the liberty to define it to suit my argument. But this definition appears to agree quite well what this term is usually understood to mean. Interestingly, this agreement includes the classical views of both Schumpeter (1934) and Kirzner (1973), which may be seen to disagree with each other: the former sees entrepreneurs to disturb market equilibria by innovations, and the latter sees them to work towards market equilibria by observing and exploiting some not yet exploited price differences. The present definition can agree with both simply by considering them only to differ in market strategies. As its main concern is the internal organization of firms, on which neither Schumpeter nor Kirzner says much, it cannot conflict with either.

As owners, entrepreneurs and managers are all defined as positions, it is possible, and under some institutions necessary, that two or all three of them are assigned to the same persons. For instance, an organization's entrepreneur may be, and often also is, the same person as its manager: the entrepreneur, after having designed, possibly only in her head, the position of the manager, may assign it to herself.

Why the rationality of owners and entrepreneurs is so crucial can be explained as follows. In all organizations, the designing and redesigning of all the other positions and their assigning and reassigning to specific individuals are done by their entrepreneurs either directly, subject to explicit or tacit approval by the owners, or indirectly, by delegating some of the designing and assigning to some of the directly assigned individuals in the directly designed positions, to begin with the managers. There may be even more indirectness, as the delegating may be multilevel, allowing or requiring some of these individuals to delegate some of the designing and assigning to yet other individuals. Moreover, all may be allowed or tolerated to modify and elaborate within certain limits their own positions, and thus engage in complementary self-organizing. Yet the entrepreneurs, and by extension the owners, remain ultimately responsible for how all this will unfold. If something goes wrong and their organization underperforms, the ultimate responsibility is theirs, for this implies that they must have wrongly designed, or allowed to be wrongly designed, some positions, and/or assigned, or allowed to be assigned, some positions to the wrong persons.

Note that all this is well known in business practice, which is why changing the CEO of a firm, who is typically both its top manager and its organizing and reorganizing entrepreneur, often dramatically changes its stock-market value. But organizational theories often view team work, collective decisions, and cooperation of large collectives as more important than leading individuals. This divergence of views is at least partly due to the difference between the functioning and the forming of organizations: much more team work and collective decisions are possible in the former than in the latter. These theories may be right about the functioning, yet without diminishing the importance of a few top individuals for the forming: while most of the functioning may be team work and collective decisions, the positions from which it is run must have been designed and the individuals who run it must have been selected during the forming and reforming under the ultimate control of some entrepreneur(s). For example, although the CEOs of firms may often work cooperatively in teams, it is typically they who select the team members and design the main lines of the cooperation. Other examples are democratically run cooperatives, all of which owe their existence and basic features to the ideas and initiative of a few enthusiastic entrepreneurs.

What remains to be explained is how rationality is allocated to the owners and entrepreneurs of organizations. The positions of entrepreneurs are largely self-designed by the individuals assigned to them, under the constraint of the capital supplied to them by owners. This supply is also the means by which their positions are assigned: owners select entrepreneurs from the more or less large number of candidates competing for their capital (who may or must include themselves). The positions of owners are designed and assigned by the property rights that constrain the ways in which they can obtain and control capital.

Simplification 1 allows the following logical shortcut: The performance of an economy depends on the performance of its organizations, which depends on the rationality of their owners and entrepreneurs, which depends on the institutions that shape the designing and the assigning of these positions.

For the other simplifications, it is necessary to split analysis into the production side and the final consumption side.

SIMPLIFICATION 2. All individuals, regardless of their rationality differences, not to starve to death, must remain final consumers.¹⁸ The final consumption side thus excludes the use of evolutionary selection (at least in civilized societies) by which insufficiently rational individuals would purposefully be eliminated. Rationality allocation is there limited to individual learning of given consumers under the constraint of their unequal learning talents, and analysis can therefore concentrate on how different institutions shape the inputs for this learning – e.g., by the rights of consumers to be informed and the duties of firms and government agencies to supply them with information. The most important organizations of this side are government agencies, usually required to determine the demand for public goods, and under some institutions moreover allowed or required to influence by certain paternalistic policies the demand for private goods.

On the production side, rationality allocation can use all of its evolutionary ways in full: most positions can be there designed and redesigned or abolished, including births and deaths of entire organizations, and individuals can be promoted to, or demoted from, all of them, without having to die. But comparative analysis can be there simplified in another way.

SIMPLIFICATION 3. The production side can be freed from the influences of subjective preferences and values, known for making all comparison difficult, by concentrating them on the final consumption side. To do so, it suffices to define the final demand broadly

¹⁸ This simplification also makes it clear that the present argument, in spite of its largely Darwinian logic, is no part of the old-fashioned “social Darwinism,” discredited for its uncivilized implications.

enough – e.g., as also including the demand for nature-protection, job-creation and working conditions – to make it express the entire task for the production side. The stream of possible errors (losses, inefficiencies) caused by little-rational economic decisions can then be divided into those on the final consumption side and those on the production side. The former mean that the final demand fails to reflect some important aspects of what may be argued to be the consumers’ true well-being (“happiness”) – on which opinions may widely differ depending on the preferences and values held. The latter mean that some resources fail to be used efficiently for meeting this demand, on which, once this demand is determined, subjective preferences and values have little to say. Analysis of this side can thus treat the final demand as a “black box,” whose contents need not be specified: whatever this might be, inefficient rationality allocation in production would always make it suffer.

III. Rationality Allocation by Markets and by Government

Addressing the markets vs. government issue has here two purposes. One is to see how comparative institutional analysis of rationality allocation can be conducted and what it can achieve when applied to a specific problem. The other is actually to find some so far little-noted merits and demerits of the two, which could bring this long-standing and still largely open issue closer to its definitive, generally accepted analytical solution.

But note two limitations. First, the aim is only to compare how markets and government work as means of allocating rationality under *given* institutions – and not as means of forming and reforming institutions. To what extent an economy’s institutions may or must be legislated by government and to what extent they may or must arise spontaneously from the practice of market transactions, although also a long-standing and still largely open issue, will not be directly addressed.

Second, rationality analysis can only complement and qualify, but not invalidate, the known results of incentive analysis. More than that, these results must be used to qualify its own results. Much like correct incentives are of little help if addressed to little-rational agents, high rationality is of little help, and may even be dangerous, if not tamed and channelled by correct incentives.

The comparison will proceed in two rounds: by verbal logic and by elementary mathematical modeling. While the former is only rough, its advantage is plausibly to include most of real-world situations. The latter is precise, but requires some not very realistic assumptions. The main reason for using both is that their results clarify and support each

other: the mathematics adds an interesting detail, and the verbal logic shows that the result of the mathematics, in spite of its unrealistic assumptions, are reasonable.

A. *The Question*

Consider a population of individuals forming an economy, each of whom keeps one basically stable position on the final consumption side, and may be selected for one or several possibly variable positions on the production side.

Assume that the rationality distribution over them is roughly normal (“the bell curve”), thus similar to the known distributions of most of human abilities, highest at “the average,” and down to very few “economic champions” and very few “economic fools” at the extremes. But its precise shape is secondary. Institutions must be able to deal with rationality inequalities, largely regardless of how distributed. Analysis is quite free to choose this shape as a special test of this general ability of institutions. The test is only required to be difficult enough not to allow poorly able institutions to pass it with success.¹⁹

The individuals know this distribution only imperfectly, the more imperfectly, the less rational they are. Moreover, as noted with reference to Kruger and Dunning (1999), they may not even know the state of their own rationality. The few who know it are not known to most of the others, and many more may believe to know it, but are mistaken. For instance, many may believe to be best, but only very few may be right.²⁰

Assume that the economy starts with a certain capital and the inefficient rationality allocation which divides the control over the capital equally among the entire population or a random sample of it. This rationality allocation is inefficient simply because too much capital is controlled by little-rational owners and too little by the most rational ones, so that the economy initially performs less well than what its capital would potentially allow it to do.

Assume moreover that whatever other positions may need to be assigned – such as

¹⁹ This requirement follows from the commonsense logic with which technical engineers test their constructions. But it may appear foreign in economics, with the widespread habit of analyzing economic systems in assumed ideal conditions. That this habit is not very fruitful is illustrated by the inability of the field of comparative economic systems to produce clear results, simply because under suitably idealized conditions, any system can be proven to be optimal. This habit is indeed one of the reasons why this field failed to foresee that so many real-world economies would fall into a crisis when faced with real-world difficulties.

²⁰ When it is recognized that people tend to overestimate their abilities, as is sometimes done in management literature, the very few who do not, but are irritatingly right that their abilities *are* exceptionally high, are often ignored (might it be that the theorists envy them?). Yet, as will become clear below, it is they who deserve the greatest attention: to find them and give them the opportunities and the incentives to show how valuable their leadership may be is the key to the success of any economy.

those of entrepreneurs and politicians – the rationality distribution over the candidates for these positions equals the one over the entire population.

To compare markets and governments for their effects on how the initial rationality allocation will evolve, consider three stylized institutional variants: primitive capitalism (PC), financial capitalism (FC) and democratic government (DG). Their property rights over capital, from which this allocation was shown to unfold, are defined as follows.

Both PC and FC force the producing organizations (including one-person firms) to compete with their outputs on markets, and both allocate the ensuing gains and losses to the capital owners of the organizations that have realized them. But PC forces the owners to be their own entrepreneurs, whereas FC allows them to select the entrepreneurs for their capital from a set of competing candidates on the financial market (possibly including themselves).

While the output of government organizations may or may not be exposed to market competition, the main feature of DG is to keep the ultimate ownership of their capital, and therefore also all their gains and losses, equally distributed among all the citizens. As this makes the number of their owners very large, these must elect from a set of competing political candidates ruling politicians, who exercise the effective ownership rights by selecting their entrepreneurs from a set of competing civil servants.

Although none of these variants can be found used in a pure form, most of today's economies can be seen to use a combination of all three. Each variant usually has a more or less large sector of its own, where rationality allocation is shaped by its specific institutions. The results of their theoretical comparison may therefore be practically useful by indicating what the relative performance of the three sectors will likely be, and what the economy stands to gain or lose by changing their relative sizes – e.g. by privatizing or nationalizing firms, or by increasing or restricting the room for financial markets.

The question can now be stated as follows: How do PC, FC, and DG compare for their effects on the evolution of rationality allocation over time, and through it, on the economy's performance? That the question is about the relative ranking of the variants, and not about their precise absolute effects, is crucial: the absolute effects would be much more difficult, if not impossible, to determine.

B. Rough Analysis by Means of Verbal Logic

The question requires considering time: an institutional variant may excel in the short run, but lose in the long run, or vice versa. Discrete time suffices, and may even be the only

manageable: the outcome of a long period is therefore understood as an accumulation of the outcomes of a series of short periods.

Each period starts with a certain rationality allocation to the owners of capital, who will influence, depending on both their rationality and the prevailing institutions, the rationality of the entrepreneurs, who always crucially influence the output of their organizations. The prevailing institutions then determine how this output will be allocated, and how this allocation will change the capital held by the owners, and consequently the rationality allocated to the control over capital for the next period. The efficiency of this allocation, and thereby the performance of the economy, will increase if some of this control is reallocated from less rational capital owners to more rational ones.

While this causal chain appears simple and clear, a complication is that none of its links is strictly deterministic, but all also depend on chance. For example, good luck may allow a little-rational owner to select a highly rational entrepreneur, while this may have bad luck, and the organization may perform poorly. For the ranking of institutional variants, however, it appears possible to neglect chance by double averaging, over both organizations and time. This means that all the results found about one organization during one period must be understood as concerning an average organization during an average period.

Why, in average, rationality matters more is the asymmetry with which chance can affect little-rational and highly rational individuals. Bad luck can lastingly eliminate even the most rational entrepreneur, but good luck can hardly help a little-rational entrepreneur more than temporarily. Thus, under the institutions that make the selection for top positions depend on actual performance, not all the most rational owners and entrepreneurs are guaranteed to succeed, but all the little-rational ones are sooner or later bound to fail.

But chance is here important for another reason: it is needed to protect the key RRR-assumption. Namely, if the performance of each organization were a deterministic function of its entrepreneur's rationality, this would be easy to infer from observations of its performance, and the assumption would have to be dropped. It is the distilling in each single case of the merits of rationality from the sea of raw data influenced by chance that is difficult and requires high rationality. As noted, this difficulty is amplified by possibilities of learning. In addition to chance, the performance may also be influenced by mistakes of the entrepreneur, who may thus appear insufficiently rational. It is then both difficult and important to estimate her talents: will she or won't she sufficiently soon learn sufficiently high actual rationality? The main task of the RRR-assumption is to lead to the following principle.

THE RATIONALITY-BOOSTING-BY-VOTING ("RBV") PRINCIPLE. Consider a

set of voters and a set of candidates from which the voters are electing a subset. If the rationality distribution is the same over both sets, if each voter has an equal number of votes, and if it is rational for the voters to vote for the most rational candidates, then the average rationality of the elected agents will exceed the average rationality of the voters.

The proof is trivial. In the worst case, the least rational voters vote irrelevantly (randomly), and will thus in average vote for candidates of the average rationality. But the more rational the voters, the more their voting will be biased in favour of above-the-average-rational candidates. When all the votes are counted, the average rationality of the elected candidates will therefore be somewhat higher than the average rationality of the voters. By extension, the average rationality of the elected candidates will be even higher, if more rational voters have more votes than less rational ones.

Rationality analysis is thus more optimistic about democracy than Hayek (1944), who accused it of selecting the worst. But this optimism is subject to two qualifications. One is that the rationality distribution over the candidates may be inferior to the one over the voters. The positive effect of voting is then more modest: the elected candidates will only be in average somewhat more rational than the other candidates, but not necessarily the voters. The other qualification concerns problems with incentives, on which more below.²¹

In any case, however, the positive effect of voting is only modest. Even in the most ideal case, with the best incentives for both the voters and the candidates, while far from selecting the worst, it remains far from selecting the best. This modesty is here crucial.

PC, FC, and DG can now be compared as follows. What matters most in the short run are differences in their uses of the RBV principle. PC does not use it at all: the owners and the entrepreneurs are the same persons, so that the average rationality of both is the same. FC uses it at least once, when the owners are choosing the entrepreneurs among the candidates on the financial market. DG uses it at least twice, when government entrepreneurs are chosen by elected politicians, and when these are elected by the voters.

Of course, neither FC nor DG imposes a sharp limit to how many times the RBV principle can be used. FC may use it more than once, by allowing markets for possibly several levels of financial intermediaries, such as investment banks, holding companies, and mutual funds. DG may use it more than twice, by adding between the elected politicians and the government entrepreneurs possibly several levels of expert committees and sub-

²¹ A frequent objection against the RBV principle has been that people often vote not for the most rational candidates, but for candidates with all kinds of other, less relevant properties. But, provided that in the given voting, it is rational for the voters to vote for the most rational candidates, then using other criteria is only a sign of their own low rationality, which leaves the principle intact.

committees. But this principle is nevertheless likely to be used more times by DG than by FC, at least initially: financial markets, even when institutions define for them the widest space, need long time to emerge, develop and actually fill this space, whereas government expert committees can be established and convoked virtually overnight. Considering that FC uses it once and DG twice can be accepted as a stylized expression of this difference.

What matter most in the long run are the differences in the allocation of the resulting gains and losses. Both PC and FC allocate them to the specific owners of the organizations that have realized them. Thus, the more an organization gains, the more the capital of its owners will increase, and vice versa. As the gain depends on the rationality of the owners – under PC directly, as they are also the entrepreneurs, and under FC indirectly, through the rationality with which they select (or at least approve of) the entrepreneurs – rationality allocation will after each period move towards efficiency: the capital that is controlled with high rationality will grow, while the one that is controlled with low rationality will shrink. In contrast, DG keeps allocating all the capital gains and losses equally among all the citizens – in order to maintain, as it must, the ultimate ownership of capital equally distributed – and the rationality allocation to the control of capital will therefore remain stationary.

The entire story can now be summarized as follows. PC starts worst. Under the plausible assumption that positive returns require entrepreneurs of a somewhat above the average rationality, most of the initial owners-entrepreneurs will keep losing capital, so that the total capital of the economy will start by shrinking. But, as they will have less and less to lose – their organizations will sooner or later go bust – their negative contributions to the economy's capital will taper off, while the positive contributions of the sufficiently rational owners-entrepreneurs are increasing and will eventually prevail. Moreover, as the capital of the most rational ones will in average be increasing faster than the capital of the others, the control of the economy's capital will tend to move towards the minority of the relevantly most rational individuals, or, more precisely, to that subset of theirs who have not been eliminated by bad luck. In the long run, the economy's growth rate will reach the maximum that its for capital ownership most rational individuals are able to achieve.

The long-term result of PC is trivial: it only confirms the old conclusions by Alchian (1950), Friedman (1953) and Winter (1971) that evolution by market competition selects for firms maximizing expected returns – that is, organized and run with the highest rationality – so that a developed market will eventually contain only such firms. The short-term result is more interesting: it suggests a new solution to the puzzle of why the growth of virtually all new market economies has followed the well-known J-curve: first dipping down (to the great

joy of market opponents), and only with a more or less long delay gradually turning upwards: many emerging markets in such economies were indeed initially scourged by large numbers of little-rational owners-entrepreneurs who grossly overestimated their rationality.

FC starts a little better. Although the initial average rationality of the owners is again the same as the one of the entire population, its use of the RBV principle somewhat improves the initial rationality of the entrepreneurs, so that the initial capital losses will be lower. But they may still be large enough to cause a negative growth of the economy, which may therefore again follow the J-curve. But the dip of this J will not be as deep and the upturn will come sooner. In a sense, however, FC cannot beat PC. They both converge to having all the economy's capital controlled by a subset of the minority of individuals with the highest relevant rationality available. FC only converges to this state faster and at lower social costs: the number of insufficiently rational entrepreneurs, the length of their tenure, and their opportunities to waste capital, are all in average smaller under FC than under PC.

As DG has the initial advantage of more uses of the RBV principle, it can start best. If the average rationality of the population is sufficiently high, these uses may immediately push the average rationality of government entrepreneurs above the threshold of positive returns, and thus allow the economy to start with a positive growth. In the long run, however, this initial advantage is of little help. The lasting scourge of DG is that the average rationality of the ultimate capital owners must remain to be the average rationality of the entire population, which can only modestly be improved by everyone's learning, constrained by the unequally distributed learning talents. Thus, even with all the extra bits by which the average rationality of the government entrepreneurs may in the best case be lifted above the population average, these entrepreneurs are bound to remain far from the economic champions eventually selected by both PC and FC. While some of the government entrepreneurs might also be champions, they can never be more than rare exceptions.

Note that it would help little if the elected politicians or by them selected experts tried to recruit champions from private enterprises. Because of the likely insufficient relevant rationality with which such recruitment could be conducted, the true champions might not be recognized. And even if they were, they would be champions of the past, who might soon start to lose, if left in the private sector, to newly appearing champions of the future. Hiring them by government could thus extend their tenure beyond its efficient limit, and might even prevent some of the new, superior champions from appearing.

The comparison of DG with both PC and FC can thus be condensed into one short sentence: DG may start best, but will end up far worst.

Empirical support appears possible to see in the history of Japanese and South Korean economies during the time when their industrial development was under an extensive control of politicians and by them selected experts, investors and entrepreneurs. For a couple of decades, this appeared to work so well that several distinguished US economists considered such industrial policies worth imitating. But soon after, both these economies unexpectedly fell into a deep financial crisis that proved to be structural, rather than cyclical, while the US economy, largely based on its relatively transparent financial markets, continued to grow. As this history appears indeed to support the present finding, this finding in turn appears to be a hopeful candidate for the still missing theoretical explanations of this history.

C. *An elementary mathematical model*²²

The model is limited in many ways: it uses only very simple mathematics, reposes on several unrealistic assumptions, and can only illustrate the main differences among the three institutional variants in their shaping of rationality allocation, while neglecting everything else. But it produces definite results that agree with the verbal analysis, and moreover discloses, as a mathematical model should, an interesting fine point that the verbal analysis could not see.

The Givens. – Consider an economy during a series of periods separated by time points $t = 0, 1, 2, \dots$. At time t its capital is K_t , starting with $K_0 = 1$, and its growth rate is $\rho_t = K_{t+1}/K_t$.

Individual rationality is graded by integer $q \in [1, Q]$, with $q = Q$ denoting its highest grade (“economic champions”). Individual i has rationality q_i , but this is not known with certainty to anyone, not even to himself. The rationality distribution over the population is binomial, with probability function $P(q)$, distribution function $F(q)$, and average \bar{q} . All individuals are voters, of whom three possibly overlapping random samples are the candidates for the positions of entrepreneurs, capital owners, and politicians.

The performance of organizations is expressed as a growth coefficient, $\pi(q)$, a monotonically increasing function of q , showing how the entrepreneurs of rationality q multiply the capital they use, $K(q)$, during one period: $K(q)_{t+1} = \pi(q) \cdot K(q)_t$. The threshold for successful entrepreneurship, q_S , is defined as $\pi(q_S) = 1$. Depending on the severity of the conditions for entrepreneurship, q_S may be much higher or somewhat lower than \bar{q} . To recall, because of influences of chance and learning, $\pi(q)$ can only be used for inferring π from q for populations

²² This section summarizes the main relationships and the main results of the model elaborated in more detail, with proofs and a numerical example (but using slightly different symbols), in Pelikan (1997).

of organizations over time, but not q from π in single cases.

In consequence, the economy's growth rate at t , ρ_t , only depends upon the distribution at t of the uses of K_t among entrepreneurs of different q , $P_t(q)$:

$$\rho_t = \sum_{q=1}^Q \pi(q) \cdot P_t(q).$$

The growth rate attains its maximum, $\rho^* = \pi(Q)$, if $P_t(Q) = 1$ and $P_t(q) = 0$ for all $q < Q$.

RRR-ASSUMPTION. Individuals of rationality q_i can safely recognize all individuals of $q < q_i$. Because of their irrelevant prejudices, they underestimate the rationality of a random subset of individuals of $q \geq q_i$ (possibly including themselves, if they suffer from an inferiority complex), and see the highest rationality equally distributed over the complementary subset of these individuals. The probability $Pr(q_i \rightarrow q)$, with which an individual of rationality q_i sees as the most rational an individual of rationality q is $P(q)[1 - F(q_i - 1)]$ for $q \geq q_i$, and 0 for $q < q_i$.

LEMMA 1. If it is rational to vote for the most rational candidates, the average rationality of the ones voted for by individuals of rationality q_i will be:

$$\bar{q}(q_i) = \frac{1}{1 - F(q_i - 1)} \sum_{q=q_i}^Q q \cdot P(q).$$

Nearly all individuals thus vote for candidates whose q is in average higher than their own, with the exception of the champions, who cannot do better than vote for their peers. And nearly all individuals vote in average for above-the-average candidates of $q > \bar{q}$, with the exception of the least rational ones, who in average vote for average ones of $q = \bar{q}$.

LEMMA 2. If all voters cast an equal number of votes, the proportion of the votes cast for candidates of rationality q_i , and thus the likely weight of these candidates among all the elected candidates, will in consequence be

$$P_V(q_i) = P(q_i) \sum_{q=1}^{q_i} \frac{P(q)}{1 - F(q - 1)},$$

where $P_V(q)$ is the probability function with which q is distributed over the elected candidates.

The distribution function $F_V(q)$ and the average \bar{q}_V can be calculated in the usual way.

RBV-PRINCIPLE. The rationality of the elected candidates, $P_V(q)$, is superior to the one of the voters, $P(q)$, as $P_V(1) < P(1)$, $P_V(Q) > P(Q)$, and $\bar{q}_V > \bar{q}$.

The Comparison. – PC starts with the capital distributed to entrepreneurs of different q according to $P(q)$. The short-run growth, at $t = 0$, will therefore be

$$(1) \quad \rho_{PC,0} = \sum_{q=1}^Q \pi(q) \cdot P(q).$$

At time t , the capital used by entrepreneurs of rationality q will grow (decrease) to

$$(2) \quad K(q)_t = \pi(q)^t \cdot P(q)$$

The economy's capital will thus grow (decrease) to

$$(3) \quad K_{PC,t} = \sum_{q=1}^Q \pi(q)^t \cdot P(q)$$

and its growth rate at t will therefore be

$$(4) \quad \rho_{PC,t} = \frac{\sum_{q=1}^Q \pi(q)^{t+1} \cdot P(q)}{\sum_{q=1}^Q \pi(q)^t \cdot P(q)}.$$

For $q_S > \bar{q}$, the growth rate will at first be negative, as the losses of the majority of entrepreneurs of $q < q_S$ will initially exceed the gains of the minority of $q > q_S$, but in the long run, for $t \rightarrow \infty$, it will converge to the maximum, $\pi(Q)$, as the capital used by all the entrepreneurs of $q < Q$ will tend to become absolutely or relatively negligible.

Under FC, $P(q)$ determines the initial allocation of capital to owners. They make their initial investment choices according to Lemma 1, and thus determine the initial allocation of capital to entrepreneurs according to Lemma 2. FC therefore starts with the initial capital distributed to entrepreneurs of different q according to $P_V(q)$, so that its initial growth rate is:

$$(5) \quad \rho_{FC,0} = \sum_{q=1}^Q \pi(q) \cdot P_V(q).$$

For owners of rationality q_j , Lemma 1 implies that the initial growth rate of their portfolios is:

$$(6) \quad \kappa(q_j)_0 = \frac{1}{1 - F(q_j - 1)} \sum_{q=q_j}^Q \pi(q) \cdot P(q).$$

What will happen next depends on the owners' q and moreover on their investment diligence. If they lazily stick to their initial investment choices – or, in nicer words, if they make long-term investments – the future growth rates both of their portfolios and of the entire economy will be different than if they frequently reinvest. But to follow these possibilities, the

model needs a highly unrealistic assumption. As noted, observing the actual performance of entrepreneurs helps only little in assessing their rationality, for much depends on the rationality with which such observing is conducted and interpreted. This note now needs to be exaggerated into the assumption that such observing does not help at all.

But there are two reasons why this assumption, however unrealistic it might be, does not devalue the model's results. First, if such observing were taken into account, owners of higher q would be found to learn more from it than owners of low q , so that the comparative advantage of the former – which is the crucial point here – would persist. Second, this assumption does not help the main result – which will be that in the long run, it is just FC that performs best – but on the contrary works against it: FC would be found to perform even better if the owners of capital were considered to learn from such observing than when they are not.²³

To take into account the difference between long-term (“lazy”) and short-term (“diligent”) investors, it suffices to consider the two extremes: all owners stick to their initial investment; and all owners reinvest after each period. All the intermediate cases, in which new investment decisions are taken only sometimes by some owners, yield intermediate outcomes.

The extremely diligent, short-term investors redistribute their portfolio according to Lemma 1 after each period, so that the growth rate of their portfolios will be constant, equal to the initial one: $\kappa_D(q) = \kappa_0(q)$ for all q and all t . At t , the portfolios of diligent investors of rationality q_j will thus grow (shrink) to

$$(6) \quad \kappa_D(q_j)_t = \kappa(q_j)^t = \left[\frac{1}{1 - F(q_j - 1)} \sum_{q=q_j}^Q \pi(q) \cdot P(q) \right]^t.$$

For the extremely lazy, long-term investors, the cumulative growth of their portfolios will consist of the cumulative growth of the capital used by the initially chosen entrepreneurs. At t , the portfolios of lazy investors of rationality q_j , will thus grow (shrink) to

$$(7) \quad \kappa_L(q_j)_t = \frac{1}{1 - F(q_j - 1)} \sum_{q=q_i}^Q \pi(q)^t \cdot P(q).$$

Comparing the growth rates that owners of rationality q can achieve with their capital as own entrepreneurs, as diligent investors, and as lazy investors, yields the following result.

²³ This assumption appears to be least unrealistic for risk-capital markets, where investors are choosing among relatively new entrepreneurs with new ideas. But even on a standard stock-exchange, where data about the past performance and the current stock prices of firms abound, these data are neither sufficient nor easy to interpret for making good investment choices. The above-the-average returns go, in average, to those investors who have the extra knack for astutely combining these data with many other observations, often including personal qualities of the firms' CEOs.

LEMMA 3: $\pi(q)_t < \kappa_D(q)_t < \kappa_L(q)_t$ for all $q < Q$ and all $t > 1$.

In plain words, nearly all owners, with the exception of economic champions, can make their capital grow faster (decrease slower) as investors than as entrepreneurs, and more so as long-term investors than as short-term investors. The reason is that little-rational owners, when reinvesting according to Lemma 1, transfer some of their capital, without realizing it, from the most rational entrepreneurs to some less rational ones.

The growth of the economy's capital under FC may consequently follow many different trajectories, depending on what the ratio of the two types of owners happens to be. But all these trajectories must be contained between two limits: the D-limit growth, in which all the owners of $q < Q$ reinvest after each period; and the L-limit growth, in which all such owners leave their initial investment unchanged. What helps to determine these two limits is that in this model, the economy's capital is always equal both to the sum of the capital used by all entrepreneurs and the sum of the portfolios of all investors.

For the D-limit growth, the outcomes can best be deduced from the portfolios of investors. As investors of abilities q are initially endowed with $P(q)$ of capital, which they make grow (decrease) by $\kappa(q)$ per period, the sum of all portfolios at t will be

$$(8) \quad K_{FCD,t} = \sum_{q=1}^Q \kappa(q_j)^t \cdot P(q)$$

and the growth rate

$$(9) \quad \rho_{FCD,t} = \frac{\sum_{q=1}^Q \kappa(q_j)^{t+1} \cdot P(q)}{\sum_{q=1}^Q \kappa(q_j)^t \cdot P(q)}.$$

For the L-limit growth, the outcomes can best be deduced from the performance of the entrepreneurs with whom the owners invested once for all at $t = 0$ (with the exception of owners of $q = Q$, who may reinvest at will without slowing the growth). As the owners have chosen the entrepreneurs according to Lemma 1, the initial capital is distributed among the entrepreneurs according to Lemma 2, which sets the share of entrepreneurs of competence q to $P_V(q)$. This share will then grow (decrease) during each period by $\pi(q)$. The economy's capital at t will grow (decrease) to:

$$(10) \quad K_{FCL,t} = \sum_{q=1}^Q \pi(q)^t \cdot P_V(q)$$

and its growth rate will then be:

$$(11) \quad \rho_{FCL,t} = \frac{\sum_{q=1}^Q \pi(q)^t \cdot P_V(q)}{\sum_{q=1}^Q \pi(q)^{t-1} \cdot P_V(q)} .$$

For the earlier discussed reasons, DG is accorded the privilege of using the RV relation more times than FC, which in this model means twice: the voters elect politicians, who select entrepreneurs. Lemma 2 will thus boost the rationality of government entrepreneurs above $P(q)$ also twice. First from $P(q)$ to $P_V(q)$ for the elected politicians, and then from $P_V(q)$ to $P_{VV}(q)$ for the selected entrepreneurs. The economy's capital will thus start growing by

$$(12) \quad \rho_{DG,0} = \sum_{q=1}^Q \pi(q) \cdot P_{VV}(q)$$

After that, however, not much will change. As the voters neither gain nor lose votes depending on how rationally or irrationally they vote – in contrast to the owners of capital who do so under FC – the elected politicians and the selected entrepreneurs may change after each elections, but the distribution of q over both of them will not. In consequence, the growth rate of the economy's capital will remain constant:

$$(13) \quad \rho_{DG,t} = \rho_{DG,0} \quad \text{for all } t ,$$

so that at t the economy's capital will grow (decrease) to

The Ranking. - According to the growth rates in the short run, expressions (1), (5) and (12) imply that at $t = 0$, DG is best, FC is second, and PC is last. If $\bar{q}_{VV} > q_S > \bar{q}_V$, DG would be the only one to realize a positive growth; both FC and PC would start growing negatively according to a J-curve, deeper for PC than for FC.

According to the growth rates in the long run, the limits of expressions (4), (9), (11) and (13) imply that for $t \rightarrow \infty$, those of both PC and FC converge to the maximum, $\pi(Q)$, while DG, with its only slightly above-the-average $\pi(\bar{q}_{VV})$, remains far behind.

To compare these alternatives for the total capital they will accumulate in the long run, it is necessary to determine the limits for $t \rightarrow \infty$ of the ratios of their respective K_t (in absolute

values, all K_t become infinite, including $K_{DG,t}$, if $\bar{q}_{VV} > q_S$). Making these ratios from expressions (3), (8), (10), (14) and determining the limits discloses that FCL will grow to become the wealthiest, FCD and PC will share the second place, while DG will become infinitely poorer than any of the others. As infinite growth is in any case impossible, the most important result is this relative impoverishment.

That FCD and PC will converge to being equally less wealthy than FCL, although FCD starts better (or less badly) than PC, is interesting to note. The reason is, in essence (for the mathematics, see Pelikan, 1997), that the losses of PC caused by little-rational entrepreneurs during a relatively short initial period turn out to equal the losses of FCD caused by little rational, but diligent investors during a longer period. When the entire growth trajectory is considered, however, FCD has the advantage that under it, the economy never gets as poor as, and remains for all finite t somewhat wealthier than, under PC.

All this fully agrees with the findings of the previous verbal analysis. The additional fine point that appears to make good sense is that little-rational investors will do better both for themselves and for the economy if they invest long-term, rather than spend effort on frequent portfolio changes.

IV. Policy Implications

Because of the differences in rationality allocation between the production side and the final consumption side, the search for policy implications is divided into the corresponding two branches. The policy implications found will be confronted with known implications of incentive analysis, both to qualify them and be qualified by them.

A. The Production Side

In principle, as noted, this side can make full use of private organizations selected by, and remaining under lasting selective pressures of, actual and/or potential competition on both product and financial markets. In consequence, as shown, their top rationality will far exceed, after a certain development period, the relevant rationality of government agents – be they elected politicians or by them directly or indirectly selected bureaucrats and experts. These certainly may, and indeed must, be highly rational for other tasks – such as becoming elected, or making a successful career within the government bureaucracy. But this rationality, which

appears more closely related to speaking nicely than acting efficiently, is typically different from the one relevant to entrepreneurship and ownership of capital.²⁴ The examples of highly successful top politicians with poor understanding of the production-side problems continue to be legion.

Markets are thus discovered to have more merits than usually recognized. In addition to working as reasonably efficient mechanisms for allocating standard resources among given participants, they are moreover found to work as evolutionary devices for selecting these participants, and thus helping to allocate to efficient uses the non-standard resource of unequally bounded rationality.

This discovery is particularly important for financial markets, whose merits are often grossly underestimated. They are found to work not only as the usually studied mechanisms for allocating investment, but moreover as evolutionary devices for selecting relevantly rational entrepreneurs and investors. In addition, they offer the little-rational capital owner opportunities to have his capital fructified by entrepreneurs with higher rationality than his own. Flock behavior and speculation bubbles, often seen as causes of inefficiency, prove on the contrary to promote it: as it is typically more rational investors who lead such flocks, and therefore gain more control over capital, and less rational ones who trail behind, and therefore lose this control, rationality allocation consequently moves towards efficiency.

IMPLICATION 1. Because of the far from the best expected rationality of government agents for entrepreneurship and ownership of capital, public policies are required to exclude all public policies that selectively intervene in the organizing and running of the production-side organizations – such as national planning, selective industrial policies, and government ownership of enterprises, including commercial and investment banks.

That excluding public policies requires public policies is worth spelling out, as opponents of all public policies appear not always to see it. What clarifies this apparent paradox is that the policies required are of the special kind that contribute to the forming and reforming of institutions, and may thus be termed “institutional.”²⁵ Although, as emphasized by many writers from Hayek (1967) to North (2005), far from all institutions can be formed and reformed by public policies, those that define the permissible scope of government

²⁴ Admittedly, some of these rationality differences may be due to learning environments, and not to initial talents. Even the most talented person, if she enters politics, will likely learn another kind of actual rationality than had she entered business.

²⁵ Institutional policies correspond to what German *Ordo*-liberalism terms “*Ordnungspolitik*,” as opposed to “*Prozesspolitik*,” and to Hayek’s (1967) “policies by general rules,” as opposed to “specific measures.”

policies definitely can. It is the legislative branch of government that forms the institutions that define and limit what its executive branch is allowed and/or required to do.²⁶

In practice, of course, national planning, selective industrial policies, and government ownership of enterprises are now all largely discredited by their poor results, and policy recommendations to abandon them have become standard. But these recommendations may still be challenged: they may still be accused of ideological bias and even formally refuted by theoretical models of optimal government behavior built on the perfect rationality assumption. Producing more theoretical support for them is therefore far from superfluous.

An important example of selective industrial policy that still attracts strong political support (in particular in Europe) is government investment in young industries and new technologies, considered to involve high risks – and more often than not also ending up with high losses. What is implied here is that the height of such risks is not an objectively given constant, but depends on the rationality with which they are assessed: what is a high risk for politicians and government officials is likely to be a much lower risk for economic champions with own successful experience in such industries. If such champions are in short supply, to try to replace them by politically selected bureaucrats – instead of inducing more of them to come forward and take part in relevant, politically unbiased selection – is therefore a serious policy error, damaging the very industries that government tries to help.²⁷

Another important example is socialism as an institutional form of production that excludes private ownership of capital. After the losses of its political attraction due to the collapse of its Soviet and East European applications, this attraction appears again to grow, perhaps most in South America. As the long-lasting theoretical controversy about its economic feasibility has not yet been compellingly concluded, it can also find theoretical support. To be sure, both socialist planning and market socialism with labor-managed firms have been found, in both theory and practice, to be prohibitively inefficient. But there is yet another conceivable form of socialism, for which compelling theoretical refutation is still missing. This is the advanced corporate form, initially outlined by Bardham and Roemer

²⁶ That government bureaucrats of the executives branch usually oppose, and often successfully hinder, legislation decreasing their power and privileges is a well-known problem that is not examined here. But such legislation is more likely to succeed, at least in democracies, if supported by analytically solid arguments.

²⁷ Probably everyone can see the absurdity of substituting government officials for missing champions in sports, yet many still seem to believe that this is the right thing to do in industries. Empirical evidence supporting this argument is in Dimo and Murray (2006). While their explanations are based on analysis of incentives, analysis of rationality allocation provides additional backing. How the two analyses may cooperate or qualify each other is discussed in Section IV.C below.

(1992), which makes the most extensive use of virtually all real markets, including markets for financial intermediaries, and differs from financial capitalism only by keeping the ultimate ownership of all the production-side organizations equally distributed among all citizens, represented by a democratically elected government. While standard theories allow this difference to be considered minor, with little impact on the economy's performance, here it is found to be fatal: it would allow mediocre rationality to pervade the entire production side, and thus cause even such a socialist economy to become prohibitively inefficient.²⁸

IMPLICATION 2. The additional importance of market competition for the selection of relevantly rational entrepreneurs and capital owners increases the importance of its maintenance, which increases the demands on properties of institutions. It is even more important than usually considered that they facilitate the forming, development, and maintenance of reasonably competitive, or at least reasonably contestable, markets, where all actual champions are kept exposed to challenges by new entrants, and where winners are selected for high relevant rationality, and not low ethical standards. These increased demands make it less likely that institutions with all of the needed properties could emerge spontaneously, which increases the demand for complementary institutional policies.

For example, in the long-standing controversy about antitrust and competition policies, this implication adds an argument *for* them. Without underestimating the well-known problem of making government act in favor of the yet unknown future champions, rather than collude with the actual ones, even imperfect solutions of this problem are often superior, especially in a reasonably transparent democracy, to inaction. Actual industrial champions, when free to use all of their typically extensive means to hinder new entry, may indeed damage the evolution of industries as much as the most inapt industrial policies.²⁹

Rationality allocation may moreover suffer because of two other types of agents: the incumbent managers of underperforming firms and the judges in bankruptcy procedures. Both may hinder the owners from replacing the managers or selling the firms to new owners, which

²⁸ The rationality argument against socialism may remind of Hayek's (1945) knowledge argument, but is broader. The latter is compelling only against informationally centralized socialist planning, for which the planners need to know what Hayek shows that they cannot. But it is less compelling against informationally decentralized planning, and appears not to work at all against socialist ownership of firms: if so many managers appointed by private owners can acquire and effectively use all the knowledge needed for making even very large firms innovative and successful, what could hinder the managers of comparable socialist or government firms from also acquiring and successfully using such knowledge? Already Schumpeter (1942/1976) answered "nothing," and until now no theory appears to have compellingly proven the opposite.

²⁹ Perhaps the strongest empirical evidence showing how unlimited freedom to form cartels can harm industrial development is possible to find in the history of German industry before the First World War, as documented by Schmidt (1996). I am grateful for this reference and its summary in English to Gerhard Wegner.

blocks the search for a more rational control of the firms' capital. The difference is that the former do so in order to defend their own positions, whereas the latter may do so because their rationality, given their education and selection, is not necessarily relevant to the uses of capital in production. Institutions are therefore also required to protect the selection function of markets against both these types agents, for which some institutional policies may again be necessary (for instance, a reform of the bankruptcy law).³⁰

Because of the key role of financial markets in the evolution of rationality allocation, their institutions call for special attention. Some of the demands on these institutions lead back to Implication 1: they need to exclude policies by which the evolutionary selection by these markets would be impaired – such as taxes on working capital and financial transactions, which would slow and blunt this selection in general, and selective subsidies to specific entrepreneurs or owners, which would distort its outcomes.

More demands on these institutions stem from the special nature of financial products: as these are mostly intangible, trading in them requires a particularly high level of trust. This increases the importance of making these markets select for high relevant rationality, and not low ethical standards. Although self-policing based on reputation effects is certainly necessary, it may not always be sufficient. Reputation is not always easy to acquire even on developed markets, and is definitely unavailable on the emerging financial markets in new market economies. Policies may therefore also be needed to help to form institutions by which such deviant selection could be hindered, or at least rapidly disclosed and corrected.³¹ The search for such policies involves the familiar problems of transparency, insider trading, corporate governance, and protection of minority owners, for which the use of legislation is often debated. Taking into account the selection problem strengthens the case *for* this use.³²

³⁰ This argument weakens the usual reason why bankruptcy laws protect incumbent managers – namely, that the protection motivates them to announce their economic distress in time, rather than hide it as long as possible.

³¹ What is rapid in this context can only be relative. Thus, the roughly two years that it took the US financial markets to disclose the scandalous mismanagement and enormous losses of Enron must be considered very rapid in comparison with the more than twenty years that it has taken to disclose – and still not completely – the comparably scandalous mismanagement and enormous losses of the French bank *Crédit Lyonnais* when it was entirely government-owned.

³² That neglecting such policies may cause extensive damage can be illustrated by the setback that hit in 1996 and 1997 the until then highly successful transformation of Czech economy towards modern capitalism. A relatively successful voucher privatization of most of the formerly socialist enterprises first allowed virtually all citizens to start trading on financial markets, either directly or through investment funds, which raised both hopes for personal success and enthusiasm for capitalism in general. But the neglect of the financial market institutions (which could have been copied from any modern capitalist economy) allowed extensive asset-stripping by dishonest managers of investment funds. This crushed much of both the hopes and the enthusiasm, and moreover caused the average level of honesty of the successful Czech capitalists selected by such an unruly market to be low. Foreign investors

As all the needed institutional policies are undoubtedly difficult to conduct, Implication 2 may appear to conflict with Implication 1, which urged government to abstain from difficult policies. Why the conflict is not real is that the two difficulties are of different magnitudes. Implication 1 concerned difficulties which require, to be systematically overcome, the highest available rationality of the rare industrial champions, whom only long-lasting market competition may discover and select. In contrast, the difficulties of institutional policies may be overcome by rationality of a less exceptional kind, that can be learned, from suitable inputs, by all sufficiently educated and logically thinking persons. Although all the needed learning inputs are not yet available, there is no fundamental reason why, in the future, they could not. Their main ingredient is knowledge of how different institutions influence the performance of economies, which should be possible to obtain by suitably directed theoretical research (of which this paper aspires to be part) and spread by literature and teaching.³³

B. The Final Consumption Side

The change of side changes policy implications in two respects. In the markets vs. government controversy, they switch from strengthening the case of markets to its weakening; and instead of being value-free, they depend on the subjective preferences and values held.

IMPLICATION 3. On the final consumption side, government no longer faces an elite of market-selected private organizations, having in average much higher relevant rationality than its own, but all the different final consumers, of whom many – in the above theoretical case, a majority – can on the contrary be expected to be less rational. A democratically elected government possesses therefore the rationality potential for helping, by means of paternalistic policies, such little-rational consumers with certain challenging choices, and thus increase their well-being, or the well-being of those of their fellow citizens who feel affected by spillovers of their consumption, or both.

Perhaps the least controversial form of such paternalism is a certain minimum of obligatory primary education, which may be seen to deal with the human capital paradox by helping individuals who are so little rational that they could not rationally invest in improving

started to avoid Prague and a large part of the electorate turned to capitalism-critical or even hostile political parties. Although since then, the institutional framework has been largely mended and many foreign investors have returned, the political damage and the low level of honesty are still far from repaired – as illustrated by the high popularity of the old communist party and the low ranking of Czech economy in the international corruption league.

³³ In slightly different terms, these conditions and the possibilities of meeting them are discussed by Vanberg and Buchanan (1994).

their rationality. More controversial examples concern health insurance and retirement plans, and information about the contents and health effects of food and other consumer goods, which government may try to supply or force the producers to supply.

This implication pertains to the recent Glaeser (2005) vs. Thaler and Sunstein (2003) controversy over the effects of bounded rationality on paternalism, where it brings support to the latter. It weakens Glaeser's anti-paternalistic argument, as this does not fully admit that rationality may be bounded so unequally that large groups of consumers may be much less rational than even the most modestly educated and imperfectly selected civil servants.

But this weakening is subject to qualifications. In part, as considered below, much depends on the possibilities to solve the incentive problem emphasized by Glaeser. In part, as noted above, much also depends on the prevailing values and preferences. If little-rational consumers hurt only themselves, whether or not to help them by paternalistic policies strongly depends on the prevailing mixture of compassion and the values of personal integrity and consumer sovereignty. If their little-rational consumption has spillover effects that also hurt others – and note that the very definition of such spillover effects depends on the subjective preferences and values of these others – the support for such policies is likely to grow, and may even include less libertarian forms than considered by Thaler and Sunstein.

IMPLICATION 4. Because both high rationality and the information on in whom it might be hiding are scarce, redistribution policies, especially those diminishing poverty, may have more positive effects than usually argued. In addition to their usually claimed potential of pleasing egalitarian values, increasing labor productivity and lowering crime level, they may also enlarge the segment of population able to enter the competition for high rationality, and thus diminish the efficiency losses from not exploiting the existing but hidden stocks of this scarce resource in individuals outside this segment.

C. Taking into Account Incentives

On the production side, both incentive analysis and rationality analysis show that markets have important social merits: the former by pointing to their powerful profit incentives and the latter to their selection of agents of high relevant rationality. Both also recognize advantages of private property rights which let markets allocate the proceeds. The difference is that incentives depend on what this allocation is expected to be, whereas rationality allocation works through what this allocation has been.

Both analyses also show that the potential of government to help, rather than harm, the

economy is seriously limited, one by pointing to its weak or distorted incentives (rent-seeking), and the other to its far from the best relevant rationality.

Interestingly, both these limitations of governments were already asserted by J. S. Mill (1861/1972): "The positive evils and dangers of the representative, as of every other form of government, may be reduced to two heads: first, general ignorance and incapacity, or, to speak more moderately, insufficient mental qualifications, in the controlling body; secondly, the danger of its being under the influence of interests not identical with the general welfare of the community."³⁴ Of these two heads, however, only the second has so far received full analytical support – from theories of public choice and rent-seeking, pioneered by Buchanan, Tollison, and Tullock (1980). While Hayek's (1945) knowledge argument supports the first head for the special case of national planning (cf. fn. 27 above), analysis of rationality allocation appears to be the only way to support it in full.

Rationality analysis makes government involvement in production more difficult to defend than incentive analysis. It shows that even if public choice theory were too pessimistic and government agents had the best intentions to promote general welfare, they would still be bound to cause important losses because of their far from the best relevant rationality. It is moreover more diplomatic, as it accords them the benefit of the doubt that they might have the best intentions, and offers them the opportunity to demonstrate it by abstaining from doing things that they are shown unlikely to do well. In contrast, public choice begins by assuming them to have bad intentions, which puts in doubt their very willingness to listen to it.

In some cases, however, incentive analysis may soften the rationality limitation of government. Examples are the markets for producer goods with extensive spillovers – such as basic research and infrastructure. Such goods are known to suffer from insufficient effective demand, and therefore insufficient incentives for their production. While the finding that the relevant rationality of government is far from the best remains valid, the lack of private incentives makes this finding less prohibitive: to tax-subsidize such goods with relatively low rationality – even if this means that much of the subsidies will be wasted on low-quality research and on far from the most useful infrastructure – is often a lesser evil than not subsidize them at all. The losses from the government's low relevant rationality can be minimized by limiting policies to subsidies and certain specifications of the demand, while keeping the supply reserved to competing private producers.

It is about financial capitalism that the two analyses agree least. Incentive analysis

³⁴ I thank for this reference to Niclas Berggren.

shows that financial markets involve agency problems that make them less advantageous than implied by rationality analysis, whereas this analysis shows that they are less bad than implied by pessimistic interpretations of agency theory. This indicates a limit to which financial markets can be advantageous: their agency losses must not wipe off their rationality gains.

There are several factors on which these losses may depend. In addition to the culturally evolved and economically selected level of honesty and trust, rationality analysis concerns two. One consists of the institutional policies supported by Implication 2 – such as enforcing transparency of corporate governance and protecting minority owners. The second is the very rationality of the capital owners (principals), which magnifies the importance of its efficient allocation. While agency theory may provide useful hints, how well or poorly agency problems are solved in practice depends above all on the rationality of the principals.

Turning to the final consumption side, paternalism is another important topic on which the two analyses disagree. In particular, incentive analysis points to the risk that the rationality superiority of government agents over large groups of consumers may be used for increasing the well-being of the former rather than the latter. This partly restores, and in a sense may even amplify, Glaeser's (2005) argument: it may be argued that the lower rationality of the latter makes this risk particularly high. On the other hand, however, in a reasonably transparent democracy, government agents are also monitored by more rational voters, who may thus help to lower this risk. Moreover, with no paternalistic policies, little-rational consumers may soften and distort the market selection of private producers and be even more at their mercy.

Combining the two analyses increases the support for redistribution policies in an interestingly qualified way. Economic incentives, which redistribution is often reproached to weaken, are shown to matter less than usually claimed. As success in a competition is a well-known human incentive by itself, the most rational individuals will often strive to show off their superiority to some extent independently of the size of their personal economic payoff.

The qualification is produced by rationality analysis itself. Its argument that economic payoffs are not only incentives, but moreover means of allocating capital from less rational to more rational control, limits redistribution by the need to keep this allocation working. This need has moreover interesting implications for the form of taxation: taxes on final consumption, possibly progressive, hurt it least, and thus allow the highest redistribution, while those on working capital, investment, and profit hurt it most.

Rationality analysis thus points out the often forgotten difference between redistributing final consumption and redistributing the control over capital in production. While much of the former may be politically demanded and analytically justified, the latter always harms the

economy. To see it clearly, recall the old egalitarian argument by Roemer (1987) that the unfortunate persons who were endowed with too little talents by nature should be economically compensated by society. Regardless of how much compassion for such persons one might feel, and for how high compensation one might consequently vote, it is clear that this compensation must be limited to parts of final consumption. To let untalented persons gain control over capital in production would ruin the economy, leaving there little to be redistributed.

V. Concluding Comments

In economic theory, rationality analysis promises to grow into a field of its own, filling up some of the well-known lacunae of existing economic theories, without unreasonable hostility to them. It does not entirely reject the perfect rationality assumption, only limits its uses to a few special cases: easy economic problems, which may be reasonably solved by most people; more difficult normative examples, trying to teach people to be more rational than they actually are; and well-developed competitive markets, whose long past evolution makes it plausible to assume that all the still present participants cannot be too irrational. But it claims that in all the other cases, it is important to recognize that what people actually do may be due not only to their preferences, incentives, and information, but also to their more or less bounded rationality with which they know their preferences, interpret the information, and respond to the incentives. As this paper has shown, these cases definitely include comparative analysis of the merits and demerits of alternative institutions.

In policy applications, rationality analysis promises to throw light on many issues, in part strengthening and in part qualifying or opposing standard views. Its use is urgently needed in all decisions about policies whose success may depend (and which ones do not?) on the rationality of government agents, or private market participants, or both. Policy analysis that naively ignores rationality inequalities may also naively support policies that fail to allow and encourage the economically most rational individuals to come forward and create wealth, while allowing economically little-rational individuals to keep causing losses.

Interestingly, the apparent ideological conflict of its sharply “pro-market” stance on the production side with the more “pro-social” one on the final consumption side makes rationality analysis more, rather than less, practically applicable. In today’s politics, this conflict appears increasingly limited to minorities of ideological purists. Mixing the two is on the contrary appearing as the only feasible way to avoid both economic ruin and political rejection by people as they are: neither as collectivistic nor as individualistic as different pure

ideologies might wish them to be. Such mixing is also gaining ground in political programs both at the Left and at the Right – as exemplified by New Labour and Compassionate Conservatism – with which the results of rationality analysis are well in line. •

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