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The new institutional economics and the theory of behaviour under uncertainty

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Abstract

The new institutional economics (NIE) is diverse in terms of the theory of behaviour under uncertainty. Some views are close to neoclassical economics, but others are similar to those held by heterodox economists. Distinctions between procedural and substantive uncertainty, weak and strong uncertainty and ambiguity and fundamental uncertainty help to identify different approaches to uncertainty in NIE. Regarding the influence of institutions on economics behaviour, not all NIE focuses on institutions as constraints and takes individuals as given. The dominant views of rationality in NIE are standard neoclassical maximization and bounded rationality, but alternative notions have also been defended.

JEL classification: B52 (current heterodox approaches: institutional; evolutionary); D81 (criteria for decision-making under risk and uncertainty); L20 (firm objectives, organization and behavior: general)

Keywords: New institutional economics; Uncertainty; Institutions; Rationality

This paper is intended to provide a selective yet fairly comprehensive assessment of how several authors associated with the new institutional economics (NIE hereafter) have dealt with some issues pertaining to the theory of economic behaviour under uncertainty. Among the issues selected are (1) the concept of uncertainty, (2) the influence of institutions on

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economic behaviour and (3) the concept of rationality. The paper attempts to contribute to classifying different views on these issues and, thus, to organize the debate about them. Some recent and significant developments in this debate are considered. In addition to their interest for the theory of economic behaviour per se, all these issues are important for understanding how NIE relates to neoclassical economics, as well as to other alternatives to the latter.

For the most part, the focus is on authors who have written seminal or important works in terms of the new institutionalist discussion of these issues. The paper is fairly comprehensive in that it covers many different approaches to these issues, although not necessarily all important authors. Moreover, several influential new institutionalist authors dealing with other relevant issues are not mentioned.

Some brief general remarks are necessary at this point. These remarks are general in the sense that they do not refer specifically to any one of the three issues selected for detailed discussion in the paper. They refer to how to define NIE in relation to neoclassical economics and to Austrian economics. Can one write of a neoclassical strand of NIE? What about an Austrian strand? These are quite controversial questions.

Let us consider, first, the relation between NIE and neoclassical economics. NIE certainly is different from the more orthodox neoclassical economics that virtually ignored or continues to ignore the analysis of institutions. After all, institutions matter to any institutional economist. How to deal, however, with an approach that extends the neoclassical approach to institutional issues that used to lie outside the realm of neoclassical economics?

Such an approach corresponds to what Eggertsson (1990, pp. 6–7) calls 'Neoinstitutional Economics' (to which Eggertsson reserves the acronym NIE, contrary to what became the common usage). This he distinguishes from what he more restrictively defines as new institutional economics, namely an approach that rejects 'elements of the hard core of neoclassical economics'.

In contrast, in a less restrictive definition of NIE, the former approach would be considered a strand of NIE. One could find some support for this classification. For example, Furubotn and Richter (1998, p. 2), in their authoritative book, maintain that 'the New Institutional Economics began simply as an attempt to extend the range of neoclassical economics. . . . In particular, marginalism was not rejected'. Although Furubotn and Richter's own view is that NIE and neoclassical economics should be seen as separate, they pointed out that this was not the case of some earlier developments of NIE (see the references to Furubotn and Richter in the discussion of rationality below). Moreover, even in the case of more recent contributions, Furubotn and Richter's (pp. 31–33) description of what they call the various subfields of modern institutional economics (a broader notion than NIE) reveals that the demarcation between NIE and neoclassical economics is not always clear-cut. The authors admit that these subfields 'overlap to greater or lesser degrees' (p. 33). Furubotn and Richter (pp. 435–441) admit that the demarcation between NIE and neoclassical economics is still under debate (see the references cited therein). Regardless of their belief that these two schools of thought can only be combined at the expense of internal consistency, Furubotn and Richter (pp. 442–448) recognize that there still are works (in their view, hybrid models with contradictory assumptions) in which this combination is attempted.

Factors like these have led authors such as Langlois (1989), Hodgson (1993b), Rutherford (1994), Kasper and Streit (1998), Nelson and Sampat (2001) to refer explicitly to a (more) neoclassical 'wing' of NIE.[1]

Let us now turn to the question of whether there is an Austrian strand within NIE. This question too has received different implicit or explicit answers from different authors. Among the scholars who include such an Austrian strand are many of those who, as seen above, also identify a neoclassical strand of NIE. See, for example, Langlois (1986a),[2] Hodgson (1993b), Knudsen (1993), Rutherford (1994), Kasper and Streit (1998) and Nelson and Sampat (2001). On the other hand, reviewers such as Eggertsson (1990) and Furubotn and Richter seem to treat NIE in such a way as to exclude an Austrian strand, as among the original proponents of NIE does Williamson (1985, p. 47). An extreme position on this side of the spectrum is represented, for example, by Palermo (1999) who defines NIE as so close to neoclassical economics that he sees Austrian economics and NIE as incompatible. In contrast, Williamson (p. 47) and Furubotn and Richter (p. 33) point out the potential complementarity between these schools of thought.

In what follows, it will be assumed that one can indeed speak of both a neoclassical branch of NIE and an Austrian one. This will not be done with an intention of arguing that the definition of NIE should in fact be broad enough to include these two approaches. Instead, the purpose is to examine how the three issues selected in this paper are dealt with by approaches that several scholars have considered as part of NIE. Such an examination may even throw some light on the debate on how to define NIE.

The remainder of the paper is organized as follows. In Section 1, three different distinctions are established so as to identify different approaches to uncertainty in NIE. The first distinction is that proposed by Dosi and Egidi (1991) between procedural and substantive uncertainty. The second is that proposed by Dequech (1997) between weak and strong uncertainty. The third is that proposed by Dequech (2000) between ambiguity and fundamental uncertainty. These concepts are explained, and most of them shown to be more or less implicitly present in NIE. Section 2 deals with the influence of institutions on economic behaviour. It starts from the claim, by other authors, that NIE still focuses on institutions as constraints. After identifying other types of influence that institutions have on economic behaviour, in addition to their role as constraints, this section shows that the focus on institutions as constraints is not characteristic of all NIE. Moving on to the issue of the concept of rationality, Section 3 discusses three different approaches to this issue in NIE. The first two are the ones most commonly noted, namely those that employ the notion of standard neoclassical maximization and the notion of bounded rationality, respectively. The third one includes the possibility of combining rationality and creativity.

After discussing all these issues, the paper's conclusion will be that the new institutionalist theoretical approach to economic behaviour under uncertainty is diverse, with different views revealing different degrees of proximity to neoclassical economics.

[1] More controversial than this is the claim that the neoclassical category is the one in which '[t]he vast majority of the work in the NIE belongs' (Rutherford, p. 3).

[2] As is well-known, Langlois is the editor of, and a contributor to, one of earliest collections of papers under the label of NIE (Langlois, ed., 1986). In a later article, Langlois (1989) considers a narrower definition of NIE, but still includes an Austrian strand.

1. Uncertainty

According to Hutchison (1984), NIE differs from standard economic theory in that it attempts to reduce the theory's level of abstraction. Hutchison highlights uncertainty as an aspect from which NIE cannot abstract if it wants to deal with institutions (but offers no specific definitions of uncertainty).

There are, within NIE, different conceptions of uncertainty, referring to different types and not just different degrees of uncertainty. Three distinctions will be adopted here that are helpful to identify and understand these conceptions.

The first distinction is that proposed by Dosi and Egidi between substantive and procedural uncertainty. Substantive uncertainty results from 'the lack of all the information which would be necessary to make decisions with certain outcomes'; in contrast, procedural uncertainty arises from 'limitations on the computational and cognitive capabilities of the agents to pursue unambiguously their objectives, given the available information' (p. 145). The authors are explicit in saying that these terms are used in analogy with Herbert Simon's distinction between substantive and procedural rationality.

The second distinction has been proposed by Dequech (1997) between weak and strong uncertainty. Strong uncertainty, in contrast to the 'weak' uncertainty of Savage's standard expected utility (SEU) theory[3] and to Knight's risk, is characterized by the absence of unique, additive and fully reliable probability distributions. This can be seen as a distinction between weak and strong types of what Dosi and Egidi call substantive uncertainty.

The third distinction is that proposed by Dequech (2000) between ambiguity and fundamental uncertainty, two types of strong (and substantive) uncertainty. The following definition of ambiguity, borrowed from Camerer and Weber(1992, p. 330), is particularly useful for distinguishing between different types of strong uncertainty: 'ambiguity is uncertainty about probability, created by missing information that is relevant and could be known'. Even though the decision-maker under ambiguity does not know with full reliability the probability that each event (or state of the world) will obtain, he/she usually knows *all the possible events*. Even when not completely known, the list of all possible events is already *predetermined or knowable ex ante*. Fundamental uncertainty, in contrast, is characterized by the possibility of creativity and non-predetermined structural change. The list of possible events is not predetermined or knowable ex ante, as the future is yet to be created.

Even in the cases in which fundamental uncertainty may diminish over time, it will never be completely eliminated. Depending on how it is interpreted, procedural uncertainty may, in contrast, conceivably disappear with the passage of time, as long as people's capability increases faster than the complexity of the decision situation. However, not all scholars emphasizing procedural uncertainty would find this possibility likely to materialize.

If the possibility of creativity is a cause of the unlistability of all the future events and consequences, then specific consequences may ensue, for example, in terms of what is the best way to behave. If some agents may be creative, another agent may also try to be

[3] The term 'standard' is used here because of the existence of generalized versions of Savage's approach (I return to this below).

creative or, in a pre-emptive attack, even before someone else: one may act unconventionally in order to better compete with possibly creative, unconventional rivals (Dequech, 2003). This is best illustrated by Schumpeter's argument that there is, in a capitalist economy, a competitive pressure for the introduction of innovations. In contrast, if creativity were not possible, and if that unlistability were the result only of people's limited capability to deal with a complex situation, adherence to strictly rule-guided, conventional behaviour would be relatively more appropriate than under fundamental uncertainty.

In the case of procedural uncertainty, economic reality is complex and populated by individuals with limited mental and computational capabilities. This characterization is compatible with different conceptions of reality in terms of the (im)possibility of non-predetermined structural change and of creative individual behaviour. Accordingly, there are two alternative views of procedural uncertainty. If that possibility is recognized, the notion of procedural uncertainty is compatible with, and complementary to, the notion of fundamental uncertainty: a reality that is subject to non-predetermined structural change may also be complex and people who are creative may also have limited computational abilities. Alternatively, that possibility may not be recognized. This latter variant of procedural uncertainty is incompatible with fundamental uncertainty.

Let us now apply these three distinctions to an analysis of how some new institutional economists have implicitly or explicitly conceived of uncertainty. As a preliminary remark, it should be noted that the same author may use different concepts of uncertainty in different studies because the type of uncertainty varies from one situation to another or because the author's views have changed over time.

To the extent that there is a neoclassical strand of NIE that keeps the neoclassical approach and extends it to institutional issues, its implicit or explicit notion of uncertainty is that of weak uncertainty (Knightian risk or Savage's uncertainty).

In contrast, an implicit notion of procedural uncertainty may be found in other segments of NIE. Williamson (1985 (Chapter 2), 1996), for example, has been influential in identifying the main behavioural assumptions of transaction cost economics (his branch of NIE), including bounded rationality. The latter term is due, of course, to Simon. Although different interpretations of bounded rationality may be found in the economic literature, one can say that, in most cases, the term is generally applied to a situation where the complexity of the decision environment is too large in relation to people's mental abilities. This also seems to be the case of Williamson. In this sense, he may be described as implicitly adopting a notion of procedural uncertainty.

A few additional comments should be made about Williamson and fundamental uncertainty. Williamson (1985, p. 178) refers in passing to contingencies that are 'even unforeseeable', but presents this as a reason for the incompleteness of complex contracts. Thus, it is possible that for him complexity rather than the characteristics of reality leading to fundamental uncertainty is what makes contingencies unforeseeable. On the other hand, Williamson (p. 58) does refer to unique events, novelty and surprise, with citations from Ludwig von Mises and George Shackle. These references notwithstanding, fundamental uncertainty does not seem important for Williamson (for similar assessments, see Foss, 1999, pp. 119–20; Slater and Spencer, 2000; Dunn, 2000).

Another influential new institutionalist to adopt implicitly a notion of procedural uncertainty is Nobel laureate Douglass North, in his classic 1990 book. He states that 'the

uncertainties in human interaction ... arise as a consequence of both the problems to be solved and the problem-solving software (to use a computer analogy) possessed by the individual' (p. 25). Like Williamson, North also occasionally refers to unique events or non-repetitive choices, therefore perhaps hinting at fundamental uncertainty, but at least in that book, he clearly emphasizes what has been called here procedural uncertainty (see his other references to the complexity of the environment, pp. 17, 20, 26 and to Simon's work, pp. 22–23). As discussed shortly, this is not so much the case of North's more recent work.

Other new institutionalists who follow Williamson and North in this regard may also be described as implicitly adopting a notion of procedural uncertainty.

Although complexity and bounded rationality are quite prominent in large parts of NIE, some new institutionalists (may) have adopted other alternatives to the neoclassical weak notion of uncertainty than, or in addition to, procedural uncertainty. For instance, there are some references in NIE to Knightian uncertainty.

Coase's classic (1937) article includes a few references to Knight and uncertainty, without an explicit concept (pp. 40, 48–50). As Coase (1991, p. 49) later made clear, however, the distinction between risk and uncertainty was not what interested him in Knight's work.

North, again, is a good example (in this case, a better one than Coase). Denzau and North (1994, p. 9) consider '[s]trong, or Knightian, uncertainty', which 'would occur when a chooser cannot be viewed as capable of having even subjective probability distribution functions defined over a set of possible outcomes. Such uncertainty is likely to occur, when the chooser cannot even state a list of outcomes ranked in terms of their values. Without such a list, one cannot act as though the situation is one of Knightian risk or of Savage subjective probabilities'. See also Clark (1997, p. 271).

Among the main reviewers of NIE, Furubotn and Richter (pp. 140, 182, 469) also make some references to Knightian uncertainty.

About the use of Knightian uncertainty by all these new institutionalists, two points must be made. First, these authors are not clear as to whether what they call Knightian uncertainty is a result of complexity, as in the case of procedural uncertainty, or not. Like North (1990), Denzau and North make, on one hand, abundant references to complexity.[4] On the other hand, their paper contains only a few references, if any, to factors that may point to, without necessarily implying, a substantive type of uncertainty.

In their turn, Furubotn and Richter (p. 182), when discussing the incomplete contract model that attempts to formalize Williamson's transaction cost approach, refer somewhat vaguely to Knightian uncertainty as equivalent to 'incomplete foresight of what the future will bring' and identify this as one of the key assumptions of the incomplete contract model. Furubotn and Richter (pp. 232–233) seem to identify complexity in relation to people's capabilities as that which underlies this 'Knightian uncertainty', explaining that the 'imperfect foresight' assumed by the incomplete contract model is related to the idea that 'it would be too costly to write down in advance all the possible contingencies'.[5] At

[4] Indeed, Furubotn and Richter (p. 165), for example, seem to interpret Denzau and North in terms of procedural uncertainty.

[5] It is not suggested here that this necessarily is Furubotn and Richter's own notion of uncertainty. See, below, the references to them in the discussion of fundamental uncertainty in NIE. A discussion of the relation between NIE and this formal literature on incomplete contracts appears in Section 3 below.

least in this case, the implication is that Knightian uncertainty is interpreted as procedural uncertainty.[6]

Second, even if understood as referring to a strong type of substantive uncertainty, as distinct both from procedural uncertainty and from Knightian risk or Savage's uncertainty, the notion of Knightian uncertainty is insufficiently clear in that it may encompass both ambiguity and fundamental uncertainty. The distinction has important implications. For example, ambiguity has been recently shown to be more easily incorporated into a generalized expected utility maximization framework than fundamental uncertainty. Not surprisingly, then, references to ambiguity or to Knightian uncertainty, often interpreted as ambiguity, have increasingly appeared in journals associated with neoclassical or mainstream economics (see Dequech, 2000, for further discussion and references).

Knight himself used the same term, 'uncertainty', to refer to what are considered here different varieties of uncertainty. Knight defines uncertainty in terms of the impossibility of determining either what he Knight (1921, pp. 224–225) calls 'a priori' probabilities or 'statistical' probabilities. At the origins of this impossibility are, however, various types of situation. In different places, Knight refers to (a) urn problems similar to what later Daniel Ellsberg discussed under the heading of ambiguity, (b) unique situations that can be thought to resemble cases of fundamental uncertainty and (c) complex situations that can be related to procedural uncertainty.

It would be easier to understand whether and how NIE differs from neoclassical economics, as well as from other schools of thought, if authors using the expression 'Knightian uncertainty' made it clear whether they are referring to ambiguity, to fundamental uncertainty, or even to procedural uncertainty.

Some new institutionalists are in fact sufficiently clear for us to attribute to them a notion of fundamental uncertainty. In this respect, it is important to consider what Rutherford (1994) calls the 'Austrian wing' of NIE. The concern with uncertainty has long been a mark of Austrian economics and different conceptions of uncertainty may also be found in this school of thought. The work of Richard Langlois, located on the intersection between NIE and Austrian economics, must be highlighted for incorporating a notion similar to what has been called here fundamental uncertainty. Langlois's (1984, 1994) own term is 'structural uncertainty'.

Significant steps toward a notion of fundamental uncertainty based on the notion of nonergodicity were more recently made by North, as he wrote, 'If this were an ergodic world, that is, one whose fundamental underlying nature was constant then once we understood that nature and developed the proper theory, we would get it right, today and in the future. But uncertainty is our inevitable lot because the world keeps on changing in novel ways. That is due in part to natural, physical causes, but it is primarily a consequence of human beings' altering the world and creating new conditions and new problems' (North, 1999,

[6] In this formal literature on incomplete contracts, Mukerji (1998) seems to provide a rare example of an explicit explanation of contractual incompleteness on the basis of ambiguity or, more specifically, ambiguity aversion. Mention should also be made to some recent works that make matters more complicated by apparently pointing to a connection between ambiguity and complexity, through unforeseen contingencies. See Dekel et al. (1998) and Ghirardato (2001).

p. 59).[7] This signals an interesting convergence between North's variety of NIE and post Keynesian economics, where Davidson (1982–1983, 1991) has long been insisting on the non-ergodicity of some stochastic processes as the foundation of an adequate concept of uncertainty (and of his interpretation of Keynes's views on the subject).[8]

Similarly, the conception of reality underlying the notion of fundamental uncertainty is embraced by Kasper and Streit when they argue that 'social and economic life evolves as an open system, whose path is not known and cannot be predetermined by anyone. As individuals are capable of creativity, they can shape history' (p. 151).[9]

Furubotn must be mentioned again, now in connection with the notion of fundamental uncertainty. On occasion, his work (e.g., Furubotn, 2001, p. 149) points to such a notion, even if not clearly separating the latter from procedural uncertainty.[10]

Finally, an explicit definition of fundamental uncertainty has been proposed by Siegenthaler (1997). For him, fundamental uncertainty characterizes a situation in which actors lose confidence in the mental models they apply. This is not the same definition of fundamental uncertainty as the one employed here; it can be understood as referring to the possible *consequences* of a sufficiently large increase in the degree of what is called in the present paper fundamental uncertainty. Regardless of this conceptual difference, in this case too there is a (somewhat loose) connection with Post Keynesianism: Siegenthaler's concept is based on his own interpretation of Keynes (1937).[11]

The difference between weak uncertainty of the substantive kind and procedural uncertainty is relevant for the discussion of theoretical and empirical issues pertaining to the form and boundaries of the firm. For example, Williamson (1975) refers to bounded rationality and, implicitly, to procedural uncertainty to justify the existence of the M-form structure. More frequently, however, as Foss (2001, p. 9) notes, the limitations of human mental capa-

[7] Another reference to non-ergodicity (in connection with path dependence, a concept also employed by North) appears in David's (1994) discussion of NIE and history.

[8] The emphasis on non-ergodicity and the convergence with Davidson's views are even stronger in the new book that Professor North is writing. I am grateful to him for giving me access to an early draft of Chapter 1, entitled 'Uncertainty in a Non-ergodic World'. North approvingly quotes Davidson's (1991, p. 132) description of an ergodic stochastic process as one in which "averages calculated from past observations cannot be persistently different from the time average of future outcomes", while the contrary may happen in a non-ergodic process. There is, however, some controversy about Davidson's broader discussion of non-ergodicity. Koppl and Butos (2001, p. 85) interpret Davidson as meaning that one cannot extrapolate or forecast, in contrast with the sense employed in statistics, described by them as follows: "A time series is 'ergodic' if its autocorrelations decay rapidly, that is, at least geometrically. Otherwise, it is 'non-ergodic."' See also Rosser (2001).

[9] This is an important idea that Kasper and Streit borrow from some segments of Austrian economics and bring into their version of NIE. See also the discussion of rationality below.

[10] Signs of fundamental uncertainty are stronger in some passages of Furubotn and Richter's book where they present their own views (rather than surveying the work of other authors). For example, Furubotn and Richter (p. 466) use George Shackle's term 'unknowledge' to characterize the future and support his argument that we do not know the content of the set of 'possible futures'. It should be noted that Shackle's identification of uncertainty with 'unknowledge' or complete ignorance about the future is not required for, or implied by, the notion of fundamental uncertainty. Shackle's is a particularly radical variety of such a notion.

[11] See Dequech (1999) for an alternative theoretical view on how to connect fundamental uncertainty and confidence and for another interpretation of Keynes on this. See also Eggertsson's (2000, p. 264) comment on Siegenthaler's notion of fundamental uncertainty, in particular his references to the possible lack of knowledge about some elements in choice sets and to the non-stationarity of economic systems.

bilities in a complex situation are invoked by Williamson to explain the existence of firms in general and their boundaries, rather than their particular forms. This is the traditional explanation of transaction cost economics for incomplete contracting.

In contrast, Langlois and Everett (1992) emphasize the difference between what has been termed here procedural and fundamental uncertainty, which they call complexity and genuine (or radical) uncertainty, respectively. For them, although complexity may have played an important role in the historical emergence of the large corporation, the vertically integrated organization does not necessarily have an advantage in the management of static complexity. Rather, it has lower dynamic transaction costs when redeploying assets in a situation of economic change. Referring to Williamson (1985), Langlois and Everett (p. 71) relate fundamental uncertainty not only to the boundaries of the firm but also to its particular form; they locate the real significance of the M-form in 'the ability to separate day-to-day decision making from strategic decision-making, allowing the corporation in effect to look ahead and plan'. Langlois and Everett insist, however, that large organizations are not necessarily always better able to deal with fundamental uncertainty than the market. Because of their limited ability, they devise a set of routines (a culture) that may make them less responsive to exploring new paths.

Another implication of fundamental uncertainty for theoretical and empirical research is, according to Hodgson (1999, pp. 258–260), the need to study dynamics, moving away from the comparative statics that characterizes transaction cost economics, as admitted by Williamson (see also Dosi and Marengo, 2000, who concede, however, that an alternative, dynamic approach is not yet fully operational).

2. Institutions and their influence on economic behaviour

Neoclassical economics, whenever it discusses institutions, can be seen as emphasizing their role as constraints. According to Khalil (1995, p. 452), NIE also still focuses on institutions as constraints. Indeed, there have been extensions of neoclassical theory that endogeneize institutional constraints by transforming them into rules accepted by mutual consent (see, for example, Favereau, 1989, on what he terms the Extended Standard Theory). *Part of NIE* may be seen as belonging to this line of research. It is also true that, even when not simply extending the neoclassical approach, other segments of NIE still focus on institutional constraints. However, it can be argued that the traditional neoclassical focus on (and often negative view of) institutions as constraints is not characteristic of *all* NIE.

Hodgson (1993b, p. 5) characterizes NIE as not only focusing on constraints, but also as taking individuals and their wants and preferences as given, at least '*for the purposes of economic enquiry*.' Again, it can be argued that these views too have been abandoned or rejected by some new institutionalists, including influential exponents of that school.

In order to show this, it is useful to make a preliminary discussion of the major types of influence that institutions have on economic behaviour. I suggest that we identify at least three such types of influence. The first, which may be called the *restrictive function* of institutions, consists in their above-mentioned role as constraints on economic behaviour. The second refers to what Hodgson (1988) calls *the cognitive function* of institutions. These two functions of institutions are not totally independent of one another, since restrictions

themselves can under certain circumstances be seen as information providers. In particular, if they restrict the behaviour of several people, they help each person to imagine the possible behaviour of the others. The cognitive function refers, first, to the information that institutions provide to the individual, including the indication of the likely action of other people. I call this *the informational-cognitive function* of institutions. Secondly, the cognitive function of institutions also includes their influence on the very perception that people have of reality, that is, on the way people select, organize and interpret information. I call this their *deeper cognitive function*. Institutions perform a third function through their influence on the ends that people pursue. For want of a better term, this can be called their *motivational or teleological function*.[12]

In my view, the characterization of NIE as focusing on institutions as constraints (that is, on their restrictive function) needs to be qualified. Authors that have been considered practitioners of NIE have pointed out the cognitive function of institutions. This is the case, for example, of Demsetz (1967, p. 347), Schotter (1981, p. 109), Langlois (1986a, p. 18), Knight (1997, pp. 694–695) and Kiwit (2000, p. 33) regarding the informational-cognitive function of institutions (see also Greif, 1994, p. 915 on cultural beliefs). Streit et al. (1997, p. 688) also must be noted for establishing, as I did above, a link between the restrictive and the cognitive-informational function of institutions. This idea is implicit in North (1990, pp. 3, 25).

More importantly, even the deeper cognitive function of institutions is acknowledged and emphasized by a few scholars within or close to NIE, most of whom were already mentioned above.

Knight, for example, turns to a non-individualistic approach in cultural anthropology to draw insights on cognition, particularly regarding two mechanisms by which social institutions in particular and cultural context in general affect the process of individual cognition (1997, p. 694). Discussing the first mechanism leads Knight to acknowledge, as already noted, that which has been termed here the informational-cognitive function of institutions. Recognition of their deeper cognitive function comes in his discussion of the second mechanism, which 'entails a more pervasive role for institutions in the cognitive process' (p. 695). Here Knight makes many important points by approvingly quoting Hutchins (1995). Knight supports Hutchins's (p. 354) argument that 'culture, context and history ... are fundamental aspects of human cognition and cannot be comfortably integrated into a perspective that privileges abstract properties of isolated individual minds'. Knight also agrees with Hutchins (p. xiv) that 'human cognition is not just influenced by culture and society, but ... it is in a very fundamental sense a cultural and social process'.[13] Knight (p. 696) goes on, 'Institutional rules do more than give content to beliefs, they also structure the processes by which the particular substantive content is established'. Thus, 'cognitive processes themselves are shaped by interaction with the external world'. Understanding the genesis of social institutions and culture 'is important not only for understanding incentive structures, but also ... for understanding processes of cognition and rationality' (p. 697).

[12] The term 'teleological' is used here in its general etymological sense of 'related to (the study of) ends' rather than as specifically referring to a characteristic of an argument or explanation.

[13] These points are conspicuous by their absence in Williamson's (1998) discussion of Hutchins's views.

This amounts to a rejection of an individualistic conception of cognition.[14] Interestingly, North has joined Knight in this rejection (Knight and North, 1997).

Other authors associated with NIE who emphasize the deeper cognitive function of institutions are, again, Streit et al. They maintain that institutions do not only facilitate cognitive processes. More than that, 'being a part of the cultural environment they also influence the individual's perception of information: It is assumed that the human mind creates cognitive models interpreting the environment. These cognitive models act like filters and influence the perception of information. . . . The cognitive models are assumed to be influenced by the process of socialization' (pp. 688–689).

Somewhat less explicitly, Clark (p. 269) also allows 'the cultural artifacts of language and of social and economic institutions' to be part of the 'external structures' that 'act as filters' in the reasoning process, working as important 'situated aspects' of the latter.[15]

Another approach to consider in this regard is that of Denzau and North. They highlighted a specific aspect of the deeper cognitive function of culturally shared mental models by pointing out their importance to the process of learning: a culturally shared mental model expedites the process by which people learn directly from experience, facilitates communication between people, which is crucial for them to learn from each other's experiences and helps to transfer perceptions to other generations. Denzau and North call these intersubjectively shared models *ideologies*, used to interpret reality, and conceive of *institutions* simply as rules of the game (constraints) used to structure and order the external environment.[16] Even if under another name, they are discussing the deeper cognitive function of what others call institutions (see also North, 1995). It may be claimed that some of these ideas already appear in North (1990, pp. 37, 42), as he argues that institutions such as 'informal constraints . . . are part of a heritage that we call culture. . . . Culture provides a language-based conceptual framework for encoding and interpreting the information that the senses are presenting to the brain. . . . In the short run, culture defines the way individuals process and utilize information'. On the other hand, in this earlier work North places much more emphasis on institutions as constraints and on the complementarity between his conception of institutions and the individualistic choice theoretic approach of neoclassical economics (p. 5).

[14] Knight (2000) offers a longer discussion of these issues. In his comment on Knight, Kiwit adopts the language of cognitive psychology to argue that internal representations (mental models) of the environment, and particularly the more abstract representations called schemata, interact with the environment. Among other stimuli of the environment to mental representations, Kiwit (p. 35) identifies the 'cultural transmission of social norms'. Although one may be led to see this as an acknowledgement of the deeper cognitive function of institutions, Kiwit's explicit discussion of the cognitive function of institutions includes only their informational function, by which 'they cognitively relieve the individual actor' (p. 33).

[15] See also Kuran (1993), whose views on the social character of individual cognition have been considered by David as closely related to the anthropologist Mary Douglas's description of the 'institutional acculturation process'.

[16] Note, however, that Denzau and North (p. 4) confusingly also state that both 'ideologies and institutions can . . . be viewed as classes of shared mental models'. It is not clear how they reconcile this with their claim, on the same page, that '[t]he mental models are the *internal* representations that individual cognitive systems create to interpret the environment; the institutions are the *external (to the mind)* mechanisms individuals create to structure and order the environment' (emphasis added).

The views of the new institutionalists mentioned so far in connection with the deeper function of institutions may be usefully contrasted with those put forward in a recent paper by Williamson (2000). He distinguishes four levels of social analysis. 'The top level is the social embeddedness level. This is where the norms, customs, mores, traditions, etc. are located' (p. 596). Discussing this level, Williamson refers to work in economic sociology that emphasizes the connection between culture and economy and distinguishes between the cognitive, cultural, structural and political kinds of embeddedness. Although this might have led Williamson in the direction of the deeper cognitive function of institutions, he still sees the informal institutions located at this level of analysis essentially as constraints. Moreover, Williamson shows no dissatisfaction with the fact that this level 'is taken as given by most [new] institutional economists' who concentrate on the two subsequent levels, namely the institutional environment (formal rules of the game) and governance (pp. 596–600).[17]

In sum, a few new institutionalist authors have been identified who discuss the deeper cognitive function of institutions and who seem to believe that it does concern economists. One possible implication of this is to make the very definition of NIE a more complicated matter than it would seem, or than it already is. For example, the acceptance or rejection of the view that individuals should be taken as given in their relation to institutions does not serve completely well as a criterion to separate NIE from other schools of thought, most notably the 'old' institutional economics.

Among these new institutionalists, North must be highlighted once more for discussing some empirical implications of the deeper cognitive function of institutions, especially for economic development. In his recent writings, North has suggested that the shared mental models of the participants in a society underlie their cultural heritage and strongly condition the provision of a favourable (or unfavourable) milieu to the kind of innovative change that leads to development.

The cognitive function of institutions is linked to uncertainty, as the latter implies some cognitive problem. Some new institutionalists (Langlois, 1986b; North, 1990, p. 25) have suggested that institutions contribute to reducing complexity,[18] and therefore, I would say, to reducing procedural uncertainty. Institutions can also be seen as reducing fundamental uncertainty. Through their cognitive function, in either of its forms, institutions give stability to people's way of acting, which in turn reduces the volatility of the economy (and reproduces institutions). They also restrict the range of possible states and outcomes. The effect on institutions on the degree of fundamental uncertainty is perhaps more clear in the case in which they provide information that would not be available otherwise, performing their informational function. While not necessary to the argument that institutions affect the degree of uncertainty, their deeper cognitive function reinforces this argument, with their effect on the degree of uncertainty being more indirect, through their influence on people's way of thinking (Dequech, 2004).

[17] The fourth level identified by Williamson is that of 'resource allocation and employment', where neoclassical economics works. Williamson also refers to a still earlier (zero) level of analysis, 'an evolutionary level in which the mechanisms of mind take shape' and to which the contributions of evolutionary psychology and cognitive science are seen as vital (p. 600). He establishes no connections between this and the first, top level.

[18] This argument may be seen as implicit in some segments of the new institutional economics where bounded rationality is used to explain the existence of institutions.

3. Rationality

As suggested above, NIE can be seen, in a broad definition, as including a strand that extends the neoclassical approach to institutional issues. Defined in such terms, this neoclassical strand can in turn be seen as keeping a *neoclassical notion of rationality* and applying it to the study of institutions. From this perspective, rationality is typically understood as corresponding to *utility maximization* or, more formally, to the satisfaction of the axioms of standard expected utility theory.[19]

It must be noted that the utility maximization hypothesis comes in three different versions: according to the descriptive (or positive) version, people do in reality deliberately maximize expected utility; the prescriptive (or normative) variety argues that people should maximize expected utility in order to be rational; in the 'as if' version, people are seen as behaving as if they were maximizing, without actually performing calculations, so that conscious deliberation is not required.

The notion of rationality as utility maximization is very clearly accepted, for example, in agency costs theory. In a widely cited paper, Jensen and Meckling (1976, pp. 307, 307n) explicitly "retain the notion of maximizing behavior on the part of all individuals" and argue that this assumption is of 'fundamental importance' (see also Jensen and Meckling, 1994). Thus, decision-makers are assumed to maximize utility by minimizing agency costs. Other articles representative of this line of research include Fama (1980) and Fama and Jensen (1983). Following Jensen (1983), the Fama–Jensen–Meckling approach has been described as 'positive' agency theory, as opposed to a more formal, normative 'principal-agent' branch of agency theory, represented by Stiglitz, Holmstrom and others. The former is more often associated with NIE (e.g., Eggertsson, 1990, p. 42). In any case, the standard notion of rationality as utility maximization is also retained in the latter.

The emergence of the property rights literature may also be seen as part of the effort to extend the maximization hypothesis to consider additional costs or constraints, in this case, institutional constraints imposed by property rights. The property rights system itself has been seen as the object of maximizing choice. Among important papers in this line of research are Alchian (1965), Demsetz (1967), Alchian and Demsetz (1972),[20] Cheung (1969) and De Alessi (1983).

The property rights approach, at least in its earlier versions, has indeed been interpreted along these lines; see, for example, the well-known surveys by De Alessi (1980, p. 3), Eggertsson (1990) and Furubotn and Richter (p. 117). In Alchian's case, however, a qualification is necessary. Classifying Alchian's work on property rights in these terms is understandable in the light of its influence through the way Alchian is often *interpreted*, namely, as supporting the 'as if' version of the maximization hypothesis with a natural

[19] For this (more) neoclassical strand of NIE (or neoinstitutional economics, in Eggertsson's terminology), 'the rational-choice model, with its emphasis on individual agents who maximize an objective function subject to constraints, is central' (Eggertsson, 1990, p. 7). In contrast, the rational choice model is among the 'elements of the hard core of neoclassical economics' rejected by an alternative approach, named new institutional economics in Eggertsson's more restrictive definition (p. 6).

[20] Alchian and Demsetz (1972) are also widely cited in the discussion of agency.

selection argument like Milton Friedman.[21] However, whether this is an accurate interpretation of Alchian's (1950) classic article on evolution is a matter of debate. Other readings have suggested that Alchian saw the selection process as leading to the survival of firms that have *positive* or *greater*, not necessarily *maximum*, profits[22] or as representing an alternative to the assumption of profit maximization, rather than supporting it; see Hodgson (1993a, pp. 198–199), Vromen (1995, pp. 22–24) and Demsetz (1996). Alchian's collaborator, Demsetz, is much more clearly in favour of the maximization hypothesis (1995, 1996).

Rationality as maximization is also present in new institutionalist game theory, as in Schotter. Likewise, Greif (1993, 1994) uses game theory to extend the rational choice approach to economic history. Finally, the assumption that 'people act as rational maximizers of their satisfactions' is also basic to what Posner (1987, p. 5) calls 'the Law and Economics Movement' or 'the [neoclassical] economic approach to law', which can be included in the New Institutional economics, broadly defined.

In sum, one can broadly agree with Furubotn and Richter (p. 3) that the traditional neoclassical hypothesis of 'complete or perfect individual rationality is assumed in the earlier work of representatives of the New Institutional Economics' and that the view still dominates some subfields of 'modern institutional economics', including some in which, as mentioned above, the separation between NIE and neoclassical economics is not clear-cut, namely agency theory, the economic analysis of the law, and public choice theory.

Another strand of NIE can be characterized as applying to the study of institutions an alternative notion of rationality: *bounded rationality*. Indeed, in the preceding discussion of uncertainty, it was pointed out that Williamson and other new institutionalists have identified bounded rationality as one of their main behavioural assumptions. It was this identification, together with these authors' emphasis on the complexity of economic environments, that led me to argue in Section 1 that they implicitly adopt a notion of procedural uncertainty. Likewise, North (1990) has argued that a modification of the traditional behavioural assumptions of expected utility theory 'is essential to further progress in the social sciences' (p. 17) and has criticized in particular the hypothesis of maximization (pp. 21, 40), defending the bounded rationality postulate instead (pp. 23, 108, where he uses Simon's more recent term 'procedural rationality').[23]

Bounded rationality is the representative *par excellence* of what Furubotn and Richter (pp. 3–4) call the assumption of imperfect individual rationality that 'is dominant in transaction cost analysis, in the more recent work on property rights, and in the new institutional approach to new economic history'.

I have so far identified two strands of NIE in terms of the notion of rationality. The first keeps the standard neoclassical maximization hypothesis, while the second adopts

[21] In NIE, Jensen (1983), for example, uses Alchian (1950) to support his own adoption of the 'as if' maximization hypothesis, as also noted by Vromen (1995, p. 53).

[22] Note that, in the property rights discussion, where utility is a more general objective than profit, Alchian (1965, p. 822) stated that 'our general postulate is that people seek to increase their utility', so that maximization is not required.

[23] Some ambivalence may be noted, however, as North (pp. 78–79) still referred, in his own theory, to maximizing behaviour in complex environments.

the bounded rationality hypothesis. Whether these are indeed two separate strands of NIE depends on how one looks at the attempts to reduce bounded rationality or satisfying to optimizing subject to information-gathering and processing costs and to constraints on mental ability. These attempts exist not only in standard neoclassical economics, but also in NIE; see, for example, Jensen and Meckling (1976, p. 307n)[24] and Demsetz (1995, p. 79).

Interestingly enough, by including additional constraints, these attempts make the optimization problem even more complex. Simon (1979) himself notes this regarding the search theory of Stigler and others, although, according to Mongin (1988), Simon is somewhat ambiguous about the optimizing version of bounded rationality. What about the 'as if' version of the standard expected utility theory? In principle, this version could be applied to complex situations, as it does not require people do actually perform all the calculations that lead to a maximization of SEU. However, Simon (1987, p. 267) acknowledges the existence of this 'as if' version and still criticizes SEU theory. He probably has in mind what he characterizes in Simon (1986) as the empirical evidence that people's behaviour does not fit EU theory (presumably either in its descriptive or in its 'as if' version). Without specifically referring to the 'as if' version of SEU theory, Selten (1990, p. 651) similarly maintains that 'the experimental evidence suggests that bounded rationality is not just some other kind of utility maximization or something close to it'. This may pose another problem for attempts to recast bounded rationality in optimizing terms (although other critics of the utility maximization hypothesis say that it is not falsifiable).

Also related to bounded rationality are some noticeable tensions in the approaches located on the intersection between neoclassical economics and NIE (or, in a more restrictive definition of the latter, perhaps on their border). These tensions are due to the incorporation of transaction costs combined with a reluctance to abandon the neoclassical maximization hypothesis. The former feature differentiates these approaches from standard neoclassical analysis,[25] while the latter obviously does not.

The above-mentioned formal literature on incomplete contracts illustrates these tensions. In part, as acknowledged by two of its main exponents (Hart and Moore, 1999, p. 115), the incomplete contracting theory can be seen as a development of the earlier transaction cost economics of Williamson and others. As such, it can be related to this latter branch of NIE. On the other hand, there are only occasional references to bounded rationality in this type of research. Some difficulties in formalizing bounded rationality seem to have played an important role in preventing it from becoming an integral part of the incomplete contracting literature so far. Most formal models of bounded rationality do not have an axiomatic basis (a recent exception is Lipman, 1999). As Selten notes in his discussion on bounded rationality: 'High powered theorists tend to feel uncomfortable with a theory without theorems' (p. 649). This is prob-

[24] This interpretation allows Fama and Jensen to include considerations of complexity and 'specific information' (detailed information that is costly to transfer among agents, which is in their view closely related to bounded rationality), without abandoning the maximization hypothesis.

[25] This is also the main criterion used by Eggertsson (1990, p. 14) to separate traditional neoclassical microeconomics from what he calls neoinstitutional economics.

ably what led Maskin and Tirole (1999, p. 106) to state that 'our profession has, for the most part, made little progress toward modelling bounded rationality in a satisfactory way'.[26]

Some authors see these tensions as a sign of internal inconsistency. It is precisely the issue of transaction costs versus perfect rationality that leads Furubotn and Richter, for example, to maintain, as seen above, that NIE and neoclassical economics are incompatible. They highlight the recognition of non-zero transaction costs as a central tenet of NIE and argue that this logically implies the substitution of bounded rationality for neoclassical perfect rationality (pp. 3–4, 29–30). In contrast, for a defence of maximizing rationality *cum* transaction costs, see, for example, De Alessi (1983).

Practitioners of NIE vary in terms of their stance toward neoclassical economics. This is obviously true if one defines NIE as including a neoclassical strand. However, it is also true even within the strand that assumes bounded rationality (for some, the only new institutionalist approach). One could say that the distance between each member of this strand and neoclassical economics varies with, among other things, the strength and extension of his or her incorporation of bounded rationality. One could say of Williamson, for example, that he does not seem to have given full flight to bounded rationality in his theory (e.g., Hodgson, 1993b, p. 12; Vromen, pp. 58–59; Pratten, 1997) and thus has not distanced himself so much from the neoclassical paradigm. For Foss (2001), transaction cost economics simply invokes bounded rationality to lend credence to contractual incompleteness. Foss defends instead a 'thick' approach to bounded rationality, starting from the work of Kahneman, Tversky and others on biases to judgement and cognition. Foss sees these biases as key determinants of transaction costs and bargaining outcomes, providing examples related to organizational inertia and the costs of organizational change, the role of opportunism, and excessive optimism and risk-taking in group-based decisions.

To make matters more complicated, in or very close to the mainstream of our profession there has been a growing incorporation of bounded rationality (see the surveys by Lipman, 1995; Conlisk, 1996, and, with special reference to game theory, Aumann, 1997), often with the aim of strengthening neoclassical economics rather than replacing it, as pointed out by Sent (1998).

Whatever the relation between neoclassical economics and bounded rationality, the neoclassical strand and the bounded rationality strand do not represent the only approaches to rationality within NIE. To mention a significant example, there have been a few *non-neoclassical critiques of bounded rationality* by other new institutionalist authors, who belong to the above-mentioned 'Austrian wing' of NIE or, to say the least, reveal some influence of Austrian economics.[27]

Langlois (1986b, p. 236), for instance, criticizes Simon's theory of bounded rationality for not paying sufficient attention to the interactions among agents as part of the environment

[26] Moreover, Hart (1990), for example, maintains that bounded rationality is not important for a theory of organizations such as the firm, although it may be crucial for a theory of court intervention in contractual disputes.

[27] Perfect (neoclassical) rationality and bounded rationality are the two notions of rationality highlighted by Furubotn and Richter. As seen above, they do not identify an Austrian approach within NIE.

where they operate.[28] Langlois (p. 252) has proposed a program for NIE as a whole (not only the theory of transaction costs) based, among other things, on what he vaguely refers to as 'a kind of bounded rationality assumption', but his notion of rationality is not the same as Simon's (or Williamson's, for that matter). His research program would admit several kinds of 'reasonable action in certain situations, including satisficing (in the narrow sense), rule-following behaviour, entrepreneurship (in the sense of Kirzner or of Schumpeter), and so on' (p. 252).

More forcefully, Streit et al. (p. 690) criticize Simon's concepts of bounded and procedural rationality for neglecting 'the creativity of the human mind'. 'Cognition', they argue, 'is not only a process of running after new information about changes in the environment. It is also a process by which new opportunities of action are created'. One of these authors, Streit, together with Kasper, has proposed a concept of 'entrepreneurial-creative rationality', 'which relates to an approach in which agents try to overcome existing constraints, whether of resource supplies, technological limits or institutional constraints' (Kasper and Streit, pp. 56, 59).

Not surprisingly, there is a parallel between this distinction between different approaches to rationality and the distinction established earlier between different approaches to uncertainty in NIE. Different views on uncertainty are associated with, or even lead to, different views on rationality.

The notion of rationality derived from standard expected utility theory and employed by neoclassical microeconomics, as well as by the neoclassical strand of NIE, is based on a notion of weak uncertainty (Savage's uncertainty). The theory of bounded rationality, in turn, is implicitly or explicitly based on a notion of procedural uncertainty.[29]

What about the notion of rationality employed by new institutionalists who work with Knightian uncertainty? The answer depends on what exactly they mean by Knightian uncertainty. As the notion of Knightian uncertainty is quite unclear, so is its relation with rationality. Some of these authors seem to suggest, as discussed above, that complexity is that which underlies Knightian uncertainty for them. If so, what they call Knightian uncertainty would be some sort of procedural uncertainty, and their implicit notion of rationality would be one of bounded rationality. If, on the other hand, Knightian uncertainty is taken to mean a strong type of substantive uncertainty, one would still need to clarify whether one is thinking of ambiguity or fundamental uncertainty.

As argued above, ambiguity has been incorporated into an expected utility maximization framework. In this case, rationality can be (and has been) conceived of as the satisfaction of some axioms that imply expected utility maximization. The difference with the standard

[28] This criticism should be qualified by acknowledging at least two things. First, Simon extensively researched organizations, which must be recognized (even by those who prefer not to include them in the definition of institutions) as an important social context in the economy. Second, there are lesser known pieces of Simon's work that do pay attention to the social environment where people act and interact and to institutions in particular (apart from organizations), even if not in the way institutionalists would do it.

[29] In the descriptive version of the standard maximization hypothesis, procedural uncertainty would be incompatible with weak uncertainty, unless boundedly rational behaviour could be reduced to maximization under additional constraints, in which case procedural uncertainty would not really exist, as agents would be capable enough to maximize. Procedural uncertainty could exist, but be compatible with weak uncertainty in the 'as if' version of the standard maximization hypothesis.

neoclassical notion of rationality lies in relaxing some axioms or combination of axioms required by the latter (such as the Sure Thing principle of Savage's standard SEU theory), leading to a generalized expected utility theory.[30]

In contrast, to my knowledge generalizations of expected utility theory do not seem to have developed a proper way to deal with fundamental uncertainty. Accordingly, the notion of rationality under fundamental uncertainty has not yet been expressed through an axiomatic maximization hypothesis.

A crucial aspect that has to be dealt with by those discussing rationality under fundamental uncertainty is the possibility of creative actions that radically transform the environment. In NIE, as seen above, there are a few notions of rationality that emphasize entrepreneurship and creativity. However, such an emphasis is not sufficient for us to conclude that these are notions of rationality under fundamental uncertainty. There exist conceptions of entrepreneurship and creativity much more restrictive than those associated with fundamental uncertainty. For example, in Austrian economics, Israel Kirzner has, at least until quite recently, treated entrepreneurship as the discovery of already existing, hidden opportunities rather than as the creation of truly new opportunities.[31]

The notion of rationality under fundamental uncertainty should not be seen as necessarily incompatible with that of rationality under procedural uncertainty (bounded rationality). As argued above, social reality can be seen as both subject to unpredictable structural change and complex. In this sense, even in such a reality rationality would be bounded by people's limited mental abilities. At the same time, if creativity and genuine innovation are possible, then rationality is not simply bounded. This must be considered by new institutionalists who have begun to incorporate a notion of fundamental uncertainty into their works.

Most economists accept the usefulness of some notion of rationality to help us deal with the existence of order in reality and, when possible, make predictions. The attempt to incorporate the additional notion of creativity is important for both theoretical and empirical research that acknowledges the widespread occurrence of innovative behaviour as creating both technological and organizational change. The possibility of innovation is a major source of uncertainty, as seen above. It is also very important in the explanation of the empirical fact of heterogeneity among firms (Nelson, 1991; Hodgson, 1999, p. 260). Furthermore, innovations may, in some cases, explain the boundaries of the firm. For example, Langlois (1992, p. 177) argues that the innovation of the moving assembly line in the early days of the automobile industry forced Ford to integrate vertically into parts manufacture. This illustrates Langlois's point that an organization 'can sometimes avoid the coordinating costs of informing, negotiating with, and persuading potential contracting parties who may not share one's faith in the proposed innovation or even, in a more fundamental sense, one's view of the world' (p. 177).[32] Finally, Yu (2001, p. 218) argues that without a good treatment of entrepreneurship, transactions costs theory has some difficulty in explaining the origin of

[30] If, as mentioned above, the appearance of recent works that connect complexity and ambiguity makes the discussion of uncertainty more complicated, the same is true for the conceptual discussion of rationality. Ghirardato, for example, adopts a generalized expected utility framework in which decision-makers are boundedly rational.

[31] Criticisms even from within Austrian economics have led Kirzner to revise in part his approach to entrepreneurship; see, for example, Kirzner (1999).

[32] These coordinating costs must be related to fundamental uncertainty (Langlois, 1992, p. 180). See also Bianchi (1995).

institutional change. He illustrates his argument with the information technology revolution (pp. 225–226).

4. Concluding remarks

The new institutionalist theoretical approach to economic behaviour under uncertainty is diverse. This is particularly true in the case of the issues highlighted in the present paper, namely the notion of uncertainty, the influence of institutions on economic behaviour and the notion of rationality. Different strands can be identified in NIE, if the latter is defined broadly. Part of NIE has adopted a neoclassical approach and extended it to topics that used to lie outside the realm of neoclassical economics. It would be a mistake, however, to characterize NIE as a whole in this way. Other strands of NIE have developed views on those issues that point to a direction that is quite different from that of neoclassical economics. At least in some important regards, the identity of New Institutional Economics as something distinct from (an extended form of) neoclassical economics must be acknowledged. Some new institutionalists have essentially incorporated transaction costs and bounded rationality. Others have gone farther away from (even an extended form of) neoclassical economics and put forward views that are, in one sense or another, similar to those held by members of heterodox schools of economic thought such as Austrian economics, the old or original institutionalism, Post Keynesianism and neo-Schumpeterianism.

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