

# Equilibrium and coordination with Shacklean expectations

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We start from Shackle's model of potential surprise to arrive at the discussion of the stability of equilibrium under uncertainty. We formulate a hypothesis for the "corridor" proposed by Leijonhufvud/Clower, relating Hick's elasticity of expectations to the degree of potential surprise associated to a given event. It is showed that the disappointment of an agent's expectation is related to the degree of convergence between expectations of different agents. The width of the corridor can then be defined in terms of this convergence.

*1. Introduction; 2. A Shacklean model of decision-making; 3. Coordination and the "corridor"; 4. Conclusions.*

## 1. Introduction

Production in modern entrepreneurial economies is decided, directed and performed by a large number of independently-run units. It is not just that different goods are produced by different people. In modern times, different stages of the same productive process are performed by independently organized agents. Decisions as to the amount and direction of efforts to be expended at each production unit are made by individual concerns inspired by one's expectations of benefits, most of the time based on precarious, incomplete or on no hard information at all. No central source of command exists to orient activities toward a consistent pattern. The State can exert some influence, but it can do so not by compulsion but by distributing stimuli and penalties, signals to private agents that are not bound to follow its wishes.

One should not be surprised to find out coordination problems and failures in a complex interdependent economy that is however spontaneously run by a multitude of independent decision-makers. Certainly more

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surprising is to find out how well organized and fundamentally stable these economies seem to be most of the time.

If decisions in a market economy are made by independent individuals what makes them consistent? How a sustainable state is generated? This is the core of the coordination problem.

Orthodox approaches appeal to the conceivability of perfectly coordinated states to serve, if not directly as a stylization of real-world economies, at least as centers of gravitation around which (or towards which) economies would move in the long run. Perfect coordination is achieved when a price vector is found that balances utilities and disutilities, ultimately reflecting (given) preferences and (objectively-described) production possibilities. When prices do reflect these factors, the economy is in equilibrium because everyone's plans are compatible with everyone else's.

Coordination concerns orthodox theorists, thus, as a feature of a state of *rest*. Their theories have seldom been able to account even to the satisfaction of their own practitioners for the processes through which an economy would reach or even get closer to these coordinated states. The solutions that are offered are purely formal, developed through the examination of the stability properties of the equilibrium configuration.<sup>1</sup>

Mechanistic solutions such as this are not acceptable to post-Keynesians. In entrepreneurial or monetary production economies, decisions are not empty. It is the compatibility of *strategies* that define the possibility of coordination. Equilibrium is a feature of processes in which agents choose strategies consistent with one another, so that their original expectations may be validated by the actual operation of the economy.

In what follows, a post-Keynesian view of equilibrium and coordination is put forth, elaborating on Shackle's potential surprise model of expectations formation. Section 2 describes the essential features of the potential surprise scheme. Section 3 defines a coordinated state for Shackle-type expectations. Finally, section 4 presents some conclusions and raises points for future research.

## 2. A Shacklean model of decision-making

In this section we will build upon Shackle's model of potential surprise a concept of social interaction useful to define stability characteristics of an economy developing in time. Shackle has consistently emphasized the non-temporal nature of his model, created to depict the *existential* dilemma of choice-making, that takes a place in a *moment* that breaks both with past

<sup>1</sup> For a detailed discussion of the limitations of orthodox treatments of the coordination problem, see Carvalho (1990).

and with future as it works as a new beginning. We propose here, however, and in contrast, that there is no reason to suppose that agents will not stick to the theories they accepted when making their decisions until the moment they either obtain new information that falsifies the theories or that they see them validated or not by the actual development of things. In this sense, we extend Shackle's model beyond its original boundaries to build propositions as to how agents confirm or deny their theories and, in consequence, as to how agents persist or change their chosen action plans. One should not lose sight, however, of the preliminary character of most of the propositions that will be made in this paper. My intention is to lay the grounds for a research on expectations formation and change rather than presenting a ready-made approach. In the remaining of this section we will first present Schackle's own model of choice. The rest of the section and of the paper will then contain my own elaboration on Shackle's theory.

## 2.1 Potential surprise

Criticism of classical and neoclassical determinism relies on the openness of decision processes. Decision is creative if it is not entirely explainable by past and current data or, using again Shackle's terms, if it is "inspired", which means that it is taken with reference to scenarios imagined by the decision-maker rather than being just an adaptive reaction to environmental data.<sup>2</sup>

Creative choice breeds uncertainty, because agents can no longer be expected to behave according to a pattern established by some *deus ex machina*. Data about the past have to be "interpreted" by agents in the light of their experience and "complemented" by their conjectures about the future. Agents are not "irrational" but are creative, meaning that there is no reason to suppose the conjectures that are made to violate the "logic" of things (Shackle, 1979, p. 57).

The uncertainty that surrounds decisions is caused by the impossibility of knowing in advance other people's plans, contingent as they also are on the decisions of everybody else. Neoclassical equilibrium, that is, that situation where all decisions are consistent and feasible, seems to be out of reach of such agents. Uncertainty as to other people's plans precludes that kind of coordination from being achieved.

Under these circumstances, as Keynes wrote, "practical men" develop "techniques" to deal with the uncertain future (Keynes, 1973, XIV, p. 114). It is the process of making decisions that change.<sup>3</sup>

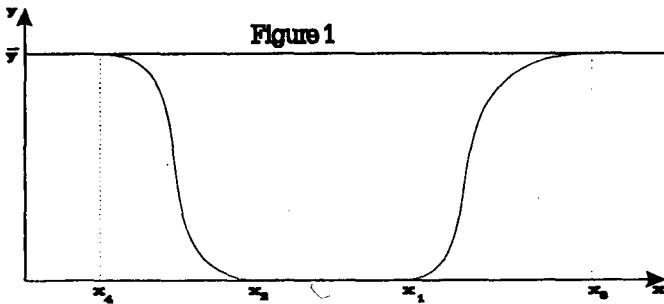
<sup>2</sup> One should note that "decision-maker" does not have to be an individual. It may be a board, provided its participants somehow agree on some expectation or action plan.

<sup>3</sup> For a discussion of Keynes' ideas on these matters, see Carvalho (1988).

To face an uncertain world and advance into an unknowable future instead of being paralysed by fear, agents have to form *theories* that will orient them in their choices and plan-setting. A theory will basically consist in a list of sequels one could relate to a given action and the degrees of plausibility that would be attached to each sequel.<sup>4</sup> A theory should be capable of classifying identified sequels into at least two groups: possible and impossible outcomes. A finer theory would moreover divide possible outcomes into *perfect* and *less than perfect* possibilities.

In other words, we are calling a *theory* a listing of sequels qualified by their degree of plausibility as seen by the decision-maker. It is intuitive that the agent should not be indifferent as to what sequel actually takes place. Some may represent gains, others represent losses. Each sequel would then be evaluated by the decision-maker according to its attractivity and its plausibility.

To describe theories with these features Shackle introduced the concept of potential surprise. It relates each listed outcome to a degree of plausibility, represented by the degree of surprise that would be felt by the decision-maker if that sequel actually took place. Perfect possibility would then mean zero potential surprise. Impossibility, on the other hand, implies a maximum degree of surprise. As Shackle (1969) shows, a scale of less than perfectly possible outcomes can be built associating to each of them a positive (but less than maximum) degree of surprise. A *theory* can then be described in a graph like figure 1, where the horizontal axis measures outcomes  $x$  (e.g., expected returns from an investment or from a decision production) and  $y$ , along the vertical axis, measures the degree of surprise that the decision-maker feels, at the moment of decision (that is, with the knowledge he has at that point) at the possibility of that outcome actually taking place in the future.



<sup>4</sup> Only those theories that are related to the choice of action plans are of interest in this context.

In figure 1, outcomes  $x_1$  to  $x_2$  are considered perfectly possible, so no potential surprise is attached to the occurrence of any of those outcomes. Outcomes  $x_1$  to  $x_3$  and  $x_2$  to  $x_4$  are seen as less-than-perfectly possible, so the occurrence of any of those sequels would potentially surprise the decision-maker. All other *listed* outcomes are deemed impossible. They must be seen as violating natural or social laws in such a way that their actual taking place would constitute a very great surprise (actually, maximum surprise) to the decision-maker. Those outcomes just don't count when the decision is to be made.

To each plan contemplated by the agent his understanding of the world would allow him to draw curves like those in figure 1. They describe therefore the *theory* the agent entertains to lead his mind from the assumed action to its possible results.

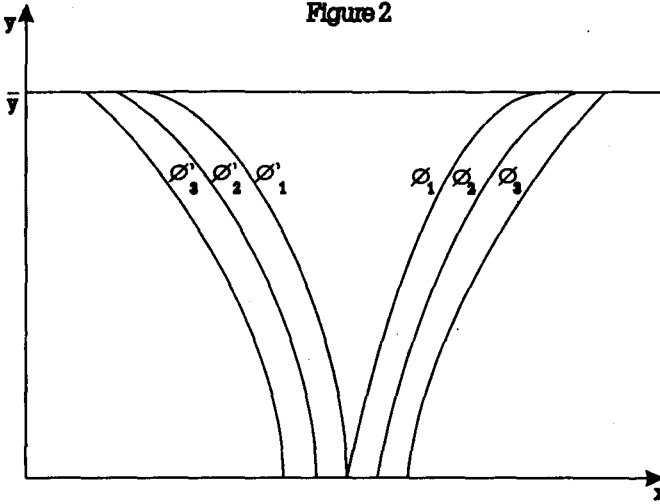
The model can be further refined if we consider that not all of possible outcomes taken into consideration are equally important to the agent's decision. Shackle proposed, first, that only the extreme values of the range of perfectly possible outcomes really matter. If a given gain from an enterprise is perfectly possible, and a higher gain is also perfectly possible, it is natural to assume that the latter result will be the one to be taken into consideration. The same is valid for losses. Therefore, only the extreme points of the "inner subset"<sup>5</sup> really matter for the decision-maker.

If one accepts this view, one can advance a little further to consider that even some of the outcomes that are less than perfectly possible may be so attractive as to lead the agent to consider them despite their more difficult actuality compared to the points in the inner subset. To deal with this, Shackle advances another relation, the ascendancy function, to describe the power of an outcome to arrest the attention of the decision-maker. This function is increasing in the attractiveness of the outcome and decreasing in the degree of surprise it generates.

The ascendancy function is represented in figure 2 as a map of indifference curves ( $\emptyset$ ) relating the value of the outcome to a degree of potential surprise that would generate the same "stimulus imparted to the individual's mind by the thought of any particular pairs of values ( $x,y$ )" (Shackle, 1952, p. 18).

<sup>5</sup> For a discussion of conditions for the existence, continuity and uniqueness of the inner subset, see Shackle (1952, chap. 2). A more formal treatment of Shackle's model can be found in Shackle (1952, 1955, chaps. 2 and 3). A discussion whether potential surprise models should be seen as a radical departure from the probabilistic approach or as a derivation of it can be found in Shackle (1952, chap. 7) for the view that it is a departure and Ford (1983) for the view that it is not.

Figure 2



We thus have a function  $\phi = \phi(x, y)$ . But  $y$ , the degree of potential surprise of an outcome, is also a function of  $x$ , so we have:

$$\phi = \phi[x, y(x)]$$

where:  $\partial\phi/\partial x > 0$ , for  $x > 0$  and  $y < \bar{y}$   
 $\partial\phi/\partial x < 0$ , for  $x < 0$  and  $y < \bar{y}$   
 $\partial\phi/\partial y < 0$ , every where

Function  $\phi$  allows us to define indifference curves between pairs of outcomes and their associated potential surprise that would attract the same attention from the individual. That is, for given values of  $\phi$ , we have:

$$d\phi/dx = (\partial\phi/\partial x) + (\partial\phi/\partial y)(dy/dx) = 0$$

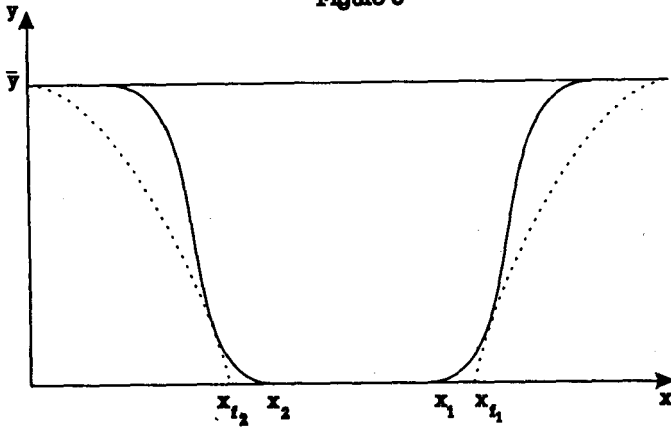
so  $dy/dx = -(\partial\phi/\partial x)/(\partial\phi/\partial y)$  is the value of the slope of the ascendancy function.

When the ascendancy function is combined with the potential surprise function, that describes the expectations actually surrounding a given action, we can identify an "attention-arresting" power of a given plan (figure 3), that will show which sequels will really be taken into consideration in the decision process. The projection into the "x" axis of the ascendancy function gives us new extreme values for the relevant subset. These extreme values are denominated by Shackle "focus-gain" ( $xf_2$ ) and "focus-loss" ( $xf_1$ ). They will represent the effective possibilities of gains and losses associated to a given plan to be compared to alternative plans to lead to a decision by the agent.<sup>6</sup>

<sup>6</sup> For this choice, see Shackle (1952, p. 29-31).

Shackle's focus is on the decision process, not on the unfolding of the chosen plan. The only extension that is explicitly considered by Shackle refers to the case of "clarification of expectations", a situation where the agent himself expects that the passage of time will shed some light on some aspects of the world that are relevant for him. This situation is described by a process of narrowing the possibilities to the extent that the plans are implemented, because the agent is able, gradually, to perceive more precisely the contours of the situation that are relevant to him and the consequences of his acts.

Figure 3



## 2.2 Validation, disappointment and learning

A process of attaining a coordinated state should be conceived as a process of trial and error, and thus of repeated making of decisions. This requires the process of expectations formation, disappointment and determination of new theories to develop under relatively stable conditions. We have to deal with the possibility of the agent finding himself under the need to decide whether to abandon a theory altogether, or to adjust it, or, even, to keep it despite eventual evidence against it.

The matter involves some serious difficulties. For one thing, all theories entertained by agents, even if confirmed by current data, may change autonomously and unpredictably because of their "flimsy foundations" and conventional nature (Keynes, 1973, XIV, p. 114). We will not deal with these autonomous changes in what follows but one should keep in mind this

possibility. We will consider, instead, a *given state of expectations* to discuss cases of disappointment.

Of course, the prime difficulty of dealing with disappointments is that in a world where there are no "correct" objective answers there are also no "wrong" answers. Only in very special conditions can reality really "disprove" a theory and even then it may be impossible to say for sure what was disproved. Most of the time, all one can say is that the evidence *seems* to be favorable or unfavorable to some hypothesis. We will propose in what follows that, for a given state of confidence, the effect of a disappointment on expectations will in general depend on how far an actual outcome is from the inner subset.

Shackle has suggested that one should use the potential surprise model only for a given date or moment, but not for intervals of time. The argument is that with the passage of time the agent learns something or the world itself can change making the knowledge behind the y-curves obsolete.<sup>7</sup>

Nevertheless, the model may be helpful to analyse the validation or disappointment of expectations. Potential surprise curves (y-curves) may change either because of an autonomous change in the state of expectations (or in the state of confidence) or because of learning of new data. The second case is entirely compatible with the idea that the agent may *learn* with realizations and eventually, if possible, even adjust his theories. This may be seen as a variant of the clarification of expectations. The autonomous change in expectations, on the other hand, implies that the agent may have to change his y-curves even before (or independently of) any realization. In this case, we can think of two possibilities: 1. He may entertain a new theory (represented by new y-curves) and this theory, then, will stand for judgement when realizations are available; 2. He may be unable to form a new theory, so realizations will not be evidence in favor or against the old theory (because it became irrelevant) or the new theory (because it does not exist yet).

Case 2 is a type of coordination crisis or breakdown and as such it could also be due to new data, collapsing into case 1 again. Therefore, although Shackle's warning against considering theories more stable than they have to be remains important, one can use his model to discuss the checking of expectations. Actually Shackle himself has done it sometimes (e.g., Shackle, 1952, p. 73; also 1968, p. 123).

In an aside to his main discussion, Shackle distinguished two kinds of disappointments: "Counter-expected event: an hypothesis which has been considered and to which as a consequence of this examination a high degree of potential surprise has been assigned. Unexpected event: a contingency

<sup>7</sup> One is reminded of Keynes's treatment of probability as a relation valid only for a given amount of knowledge by the decision-maker. See Carvalho (1988).



which has entirely escaped attention, which has never entered the individual's mind, and has formed no part of any hypothesis. ... A person's structure of expectations may be more completely demolished by an unexpected event than by a counter-expected event; the former reveals not merely a misjudgement, but the fact that the individual is not only unable to know some essential features of the situation but has been ignorant of the existence and extent of his ignorance" (Shackle, 1952, p. 73-4n).

An unexpected event shakes the foundation of the theory entertained by the agent and forces him to reconsider it. In this case, Hicks' elasticity of expectations would be higher than one and the resulting configuration of actions and behaviors would be drastically changed. It is reasonable to suppose that such a deep disappointment would require some time to be classified and understood in a new theory causing some paralysis until new hypotheses could be formulated.

Counter-expected events may or may not be as destructive as the unexpected event, depending on how impossible the decision-maker judged that event to be according to his theory. In what cases would the agent consider his theory wrong and in what cases just incomplete, demanding relatively minor adjustments?

We will say expectations are confirmed or validated when the realization falls into the inner subset, that is when the actual outcome is one of those considered perfectly possible when the decision was made. Expectations are repeatedly validated when realizations, even if of different values, fall continuously into the inner subset. Different values, thus, may be compatible with the same state of expectations, as long as they belong to the inner subset. In this case, the elasticity of expectations is zero and the agent will see no reason to change his interpretation of how the world works.

If the actual outcome falls outside the inner subset we have to determine whether or not the deviation is confined to the neighborhood of the inner subset. We will define the *neighborhood* of the inner subset the segment between the highest gain to which zero potential surprise is attached and the focus gain, and the same for the loss. That is, those results that even if not deemed perfectly possible to the decision-maker at the moment of decision were sufficiently significant to concentrate his attention when the expectation was formed and to determinate his choice.

If the actual outcome falls into this range, the agent may expect that his theory was basically correct even if incomplete, since he did not identify the ways that would *make* that outcome *perfectly* possible in advance. Under these circumstances, we may expect an adjustment of the theory around the results that proved themselves to be possible. In Hicks' terms, it would mean an elasticity of expectations between zero and unity. The theory was changed but it was not necessary to proceed to a complete overhaul.

In contrast, if the actual outcome falls outside the neighborhood of the inner subset, meaning that it was seen as an unpalatable result at the moment of decision, some important misjudgment may have been made, requiring more drastic theory revisions. In particular, if the outcome is far away from the focus-outcomes the agent may be caught in situations for which he was unprepared. For instance, an effective loss greater than the focus loss (to which we could expect the agent to be prepared) may transform a speculative agent in the sense of Minsky into a Ponzi agent (Minsky, 1986). In these cases, even if the agent was willing to insist in his old theory he could be prevented of doing so by the material impossibility of repeating the decision. The elasticity of expectations in this case would be greater than one.

One should remember that among the elements about which the decision-maker has to form theories is the behavior of other people.<sup>8</sup> Confirmation of expectations require that the decision-maker anticipates not only the results of material relations but also of social interaction. As a consequence, a state of coordination of activities requires that agents' expectations about other agents' expectations and decisions to be correct, that is, that the expected behavior of other agents falls into the set of perfectly possible outcomes. In the aggregate, it requires that there be some outcomes to which most or all agents attach zero potential surprise so that its realization will negate nobody's theory. If inconsistent expectations emerge, we have to inquire whether they result in outcomes located at the *neighborhood* of the inner subset, case in which we can expect a more or less smooth process of adjustment, or to outcomes that amply falsify the agents' theories, case in which adjustment can be difficult or even impossible at least until an extended period of disarray take place.

### 3. Coordination and the "corridor"

#### 3.1 Repetitive decisions of firms

We are now prepared to advance some ideas as to how coordination should be conceived and could be achieved. Firstly, we have to define the range of

<sup>8</sup> That, by the way, is seen as main reason for the diversity of perfectly possible outcomes envisaged by decision-makers and, therefore, of uncertainty itself. As put by Shackle (1952, p. 14): "Now it is clear that in all ordinary cases this 'inner' subset must comprise at least one member; but the knowledge which any person can possess of the present intentions and means of action of other people, and of what will be their reactions in the further future to each other's immediately future acts, is so extremely slight and insecure that, in reality, the inner subset will always consist of a large number of hypotheses whose mutually, dissimilar members will differ from each other very widely".

processes that can be treated from this point of view. There are two main conditions to be filled. The first condition is that the processes that are being studied should be repeatable at somewhat short intervals so that the agent can effect many trials, being relatively free to change his theory at each one of these trials. The second condition is that the timing of these processes must be roughly coincident for a large number of agents so that they can test their theories against each other's behavior in a relatively continuous way. Production and pricing processes satisfy these conditions. Investment decisions do not.<sup>9</sup> For this reason, we will consider the theme of coordination irrelevant for investment processes, treating them as autonomous crucial decisions that require a particular theory every time they are put into operation. In cases such as the latter, Shackle's potential surprise scheme is important, then, to understand how the decision is made but no extension of it is proposed to do the "checking" of expectations, along the lines set in the preceding section (see also Davidson, 1978).

Being repeatable does not make production or pricing decisions free of uncertainty. Firms do not produce for their own use. They produce for sale, distant in time and space, and this makes enterprise intrinsically speculative (Keynes, 1981, XIX, p. 114). To be able to adjust production and prices to a given state of the market does not give any guarantee against sudden and drastic changes in these same markets. Changes in competitive practices, process and product innovations, unexpected changes in relative prices or in the availability of inputs, all of these, among others, are reasons to expect that certainty (or the kind of complete knowledge involved in probabilistic models) can never be attained. Financial institutions, in addition, are also subject to uncertainty even as they do take similar decisions all the time.

Decision-makers such as firms and banks have to renew their production, pricing and financing decisions every "day" (Keynes, 1964). A learning process, then, takes place, which means that agents recognize some stable features of the environment they move within and take account of them in the shape of their potential surprise curves (Shackle, 1968, p. 141). The diversity of the past experience illustrates for the decision-maker the plausibility of some outcomes and may even give some indication of extreme points of a priori possibility, that is, the limits of the inner subset.

<sup>9</sup> See Keynes (1964, chaps. 5 and 12). In the post-General Theory debates Keynes remarked: "Entrepreneurs have to endeavour to forecast demand. They do not, as a rule, make wildly wrong forecasts of the equilibrium position. But, as the matter is very complex, they do not get it just right; and they endeavour to approximate to the true position by a method of trial and error. (...) It corresponds precisely to the higgling of the market by means of which buyers and sellers endeavour to discover the true equilibrium position of supply and demand" (Keynes, 1973, XIV, p. 182).

Firms deciding output and prices may regard as the superior limit to the inner subset the best sales or revenues they may have experimented on a given past stretch of time, the same being valid to set the inferior limit. These events have an special claim to perfect possibility since they were realized at least once. For the focus-gain one could use the same experience plus whatever other element of expectation they may have that could be an additional influence in the future to define a level of revenue that, although hitherto unattained, was still attractive enough to arrest the attention of the decision-maker. The focus-loss, on the other hand, may be set in terms of some minimum need of financial resources to sustain operation.<sup>10</sup>

### 3.2 Coordinated states

A given situation is coordinated when agents's decisions are consistent and therefore are sustainable, confirming thereby the expectations that led to those decisions. If then no new autonomous elements of expectations are introduced, the situation would be an *equilibrium* and would be repeated until changes in expectations induce decision-makers to change plans. We may say that the elasticity of expectations to realizations is then zero and that agents do not see any reason to change the theories they entertain.

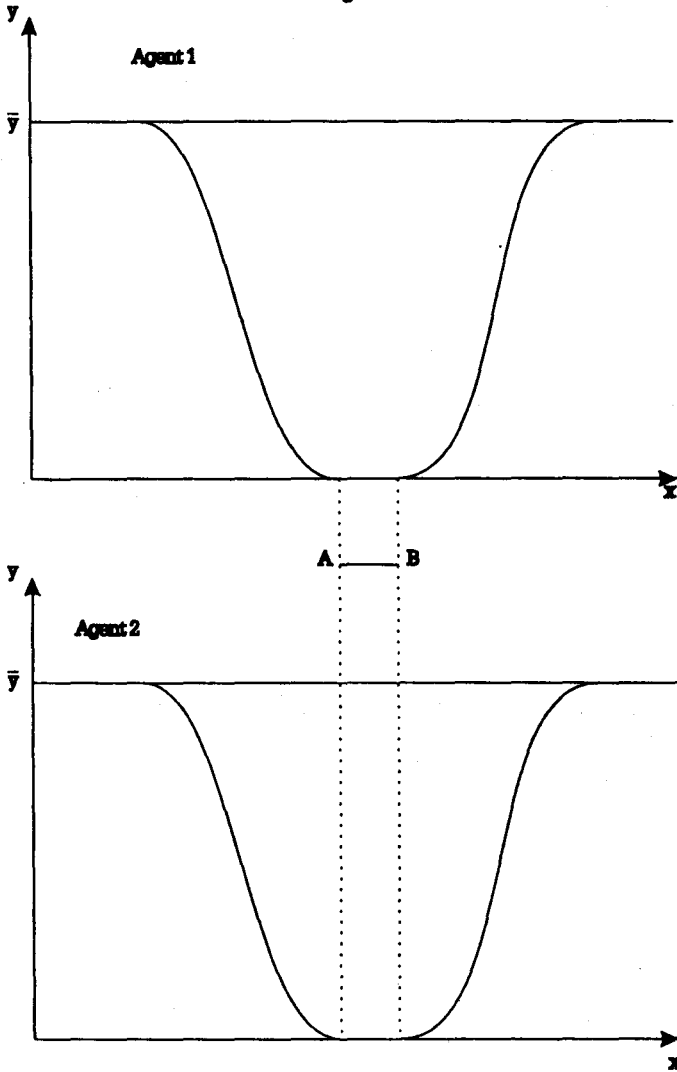
Consistency between plans is attained when actual outcomes fall into the inner subset of the relevant decision-makers. The space of coordination then is defined by the common subset of perfect possibilities entertained by the agents of this economy. For an economy with two agents, coordination could be achieved if the outcome of the process being portrayed had fallen into the segment *AB*, in figure 4a.<sup>11</sup>

In an economy with many agents, some of them may be "surprised" with a given actual outcome. If this outcome, however, is located between the extremes of the inner subset and the focus values, as we saw, we could expect some smooth adjustment of expectations on their part (elasticity of expectations less than unity). If these agents are, moreover,

<sup>10</sup> Consider, for example, Minsky's taxonomy of balance sheet postures. For the hedger, the inferior limit would be net revenues large enough either to service his debt or to be covered by his liquid reserves. For the speculators, the inferior limit could be set at the point beyond which the revenues would not be sufficient to pay interest on their liabilities. In both cases, the "focus-loss", the most attention-arresting possibilities would be those related to the maintenance of the portfolio posture selected by the agent. With larger losses the agent would be prevented from maintaining his theory, even if he still believed on it.

<sup>11</sup> There would be no sense in constructing an "aggregate" potential surprise curve. However, we can define a coincidence of subjective views of reality in terms of zero potential surprise. In other words, it may be impossible to compare degrees of disbelief but this does not prevent us from stating when a given result is seen as perfectly possible, an extreme position, by more than one agent. We do not have a common scale but we do have a common zero.

Figure 4a



a small portion of the relevant group, their adjustment process would be even helped by the stability that would characterize a process that found its consistent situations. If, in contrast, those are a large proportion of the total group the process may create some difficulties of coordination. Finally, if the surprise is significant, with outcomes located outside the adjusted (for the focus-values) common inner subset we will have a situation of sharply inconsistent plans. The results may be so far away

from what was expected that most agents think it impossible just to adjust his theories. This represents a crisis in the operation of the economy, that lasts until agents can get a hold again of the situation by the elaboration of new theories that can be consistent.<sup>12</sup>

### 3.3 Stability and the “corridor”

A coordinated state is stable if actual outcomes repeatedly fall into the common inner subset. Stability is restored to its original meaning that referred to the capacity of a given configuration to stand shocks. Deviations from past values are judged against the theories that agents held to establish whether or not the theories are being falsified. Of course, the larger the set of “perfectly possible events” the more stable the economy is. In the terms of the model presented, the longer the common inner subset the larger the diversity of outcomes that can be absorbed by the economy without changing its ways.

The common inner subset defines a *corridor of stability* for an economy in the sense proposed by Leijonhufvud (1981). The “corridor” is a “region” around an equilibrium position where shocks can be absorbed. Outside the corridor, a shock would be, in contrast, amplified. The width of this corridor depends on the extent of the common inner subset.

Being a combination of individual beliefs, the dimension of the corridor depends, then, on two elements: a) the extent of the inner subset defined by each agent; b) their degree of coincidence.

For the individual, the smaller the inner subset the better for a short segment of perfect possibilities indicates that the knowledge the agent has about the process under study is precise enough to allow him to narrow down the sequels of his decisions. In contrast, a long segment represents a large variety of perfectly possible outcomes indicating that the agent is not able to get hold of all the essential influences that may be operative. It may also mean that to a large focus-gain there corresponds an equally large focus-loss, indicating that the whole initiative may be too risky. The multi-

<sup>12</sup> The scheme being proposed allows one to remain critical of the notion of gravity centers (in particular *long run* gravity centers) and at the same time recognize sources of stability over time such as those mentioned by Harcourt: “But we do know that well-established rules of thumb exist in the business world, that pay-off periods, or desired or target rates of return, for example, fall within definite ranges, where exactly depending on expectations, confidence and the extent and intensity of uncertainty at any moment of time. We know that wage-earners have concepts of what is fair in relative wage structures, and in the overall share of wages, too, and that conservative politicians remind us, as they attempt to cut real wages, that they are trying to re-establish the historical share of profits without which it is not possible to expect the accumulators to accumulate” (Harcourt, 1982, p. 218-9).

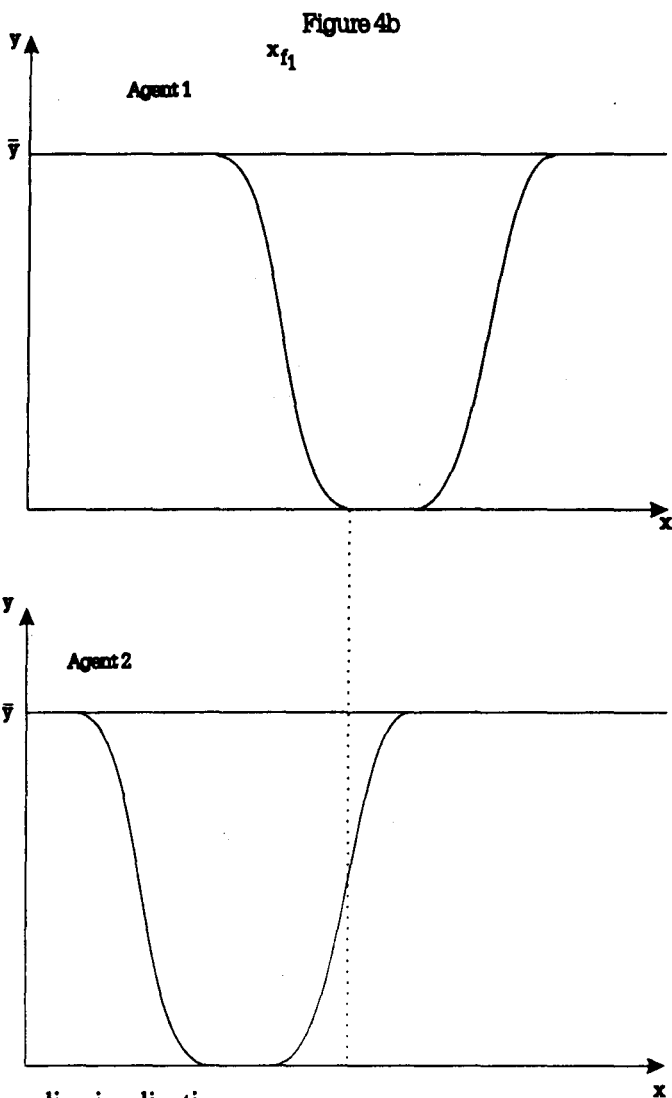
plicity of alternatives is, according to Shackle, in itself a definition of uncertainty.

From the aggregate point of view, the larger the common inner subset the more stable the economy is, in the sense that a large number of possible outcomes can be interpreted by agents as a confirmation of their theories thus leading them to keep them and to repeat their plans. This is so because the common inner subset is just a measure of the degree of agreement between agents, not a guide for their decisions. In this case, only a few individual agents at each time would perceive the necessity to reorient their theories while all the rest may consider their theories to have been confirmed. The fact that the latter would tend to continue with their selected strategies creates an "anchor" for those searching for new or adjusted theories. This remark highlights the interdependence of individual expectations in the determination of the corridor. If we consider, on the other hand, shocks that falsify the theories of a great number of agents, the corridor may collapse and the economy plunge into instability.

Figure 4a illustrates the existence of a corridor of stability given by the segment *AB*. Figure 4b illustrates an economy where the theories held by the two agents cannot be coordinated.

Although the precise location of the inner subsets and the surrounding possibilities may in principle freely vary from agent to agent, learning of the stable features of an environment, allowed by repetition of a given decision, as we saw, may contribute to some kind of "theory-sharing" among decision-makers.<sup>13</sup> We can distinguish three groups of elements that can be stable enough to become common parameters to most agents: a) material elements, such as availability of inputs and technologies; b) conventional elements, such as wage relativities and competitive practices; and c) institutional elements, perhaps the most important ones, such as contracts, fiscal and monetary policies, external relations, incomes policies, modes of wage bargaining, etc. All these elements serve as common information with which agents form their theories thereby allowing some degree of coordination.

<sup>13</sup> Especially when one remembers that Shackle, as Keynes, supposes that expectations are formed *rationally* with respect to its premisses. E.g.: "To play its part in decision, imagination must be constrained to be congruous with what the decision-maker knows of the nature of things in general and of human nature; and constrained also to be congruous with the time available for transformation of the actual situation at the decision-maker's present into his desired situation at its specific calendar location... But if we opt for non-empty decision this does not, in my belief, cut us off from supposing that the decision-maker uses knowledge, logic and a tense and anxious judgement in composing his imaginative power ..." (Shackle, 1969, p. 11, 31).



### 3.4 Some policy implications

A coordinated state can be achieved by accident. Nevertheless, given the complexity of modern entrepreneurial economies, coordination will most probably result of some external influence exerted by stable features of the economy, helped by deliberate political action by the state.

When private agents operate under uncertainty one of the most important roles of the state is to give them a “map” of the future. The state can do it not only because it may see longer but most importantly because it can shape the future to an extent that no private agent can. Free from the risk of



bankruptcy (except in extreme conditions) the state can implement long-term plans. With its weight, it can push private agents into a socially desired situation.

This was the main stabilizing role of the state in a capitalist economy envisaged by Keynes. It would be accomplished both by informing some crucial elements of the future, such as the level of employment that would be pursued by the government in the longer term, and by smoothing out disturbances that could plague the more immediate future, through its policy instruments. More than the use of any specific instrument or group of instruments the most characteristic feature of Keynes's policy proposals was the creation of a stable environment where private agents could make decisions with less influence of the uncertainty that plagues an entrepreneurial economy. Both institutional reform and direct appeal to intervention when necessary were the ways through which the stabilization was to be achieved. But the goal was to induce private agents to act by reducing the uncertainties under which they had to make decisions.<sup>14</sup>

#### 4. Conclusions

In Keynes's entrepreneurial economy, decisions are non-empty. Agents shape the future through the plans they implement, oriented by expectations formed under fundamental uncertainty.

To understand the operation of such an economy, and how it coordinates the activities of its agents it is necessary to examine how expectations are formed and how they are checked. This paper was a first attempt in this direction, using a model of expectations formation created by Shackle.

In another work, this author discussed the proximity of ideas of Shackle and Keynes on uncertainty and expectations (Carvalho, 1988). If this proximity is accepted, the scheme presented here may help post-Keynesians to formulate new concepts of equilibrium and stability, and to develop the notion of critical points or threshold points beyond which economies may become unstable.<sup>15</sup>

Further research along these lines should explore the (durable and transitory) elements that influence the choice of strategies by the most relevant agents, as well as the effects of state intervention in shaping the

<sup>14</sup> A similar point is made by Kregel (1983). Evidence in favor of this interpretation of Keynes's views on policy is found in Keynes, 1980, XXVII.

<sup>15</sup> The scheme proposed in this paper was used by the author to analyse the concepts of high and hyperinflation as well as the critical points of transition from one regime to the other. See Carvalho (1991). The concept of "corridor" was also employed by Feijó (1991).

environment that support these strategies. A particularly important subject to be studied refers to markets where *divergence* of expectations, rather than coincidence, is a condition of stability, as in the markets for bonds, according to Keynes and Shackle.

## Resumo

Neste artigo discute-se, a partir do modelo de surpresa potencial de Shackle, a questão da estabilidade do equilíbrio sob incerteza. Desenvolve-se uma formulação para a hipótese do "corredor", de Leijonhufvud/Clower, em que se relaciona a elasticidade de expectativas, de Hicks, com o grau de surpresa potencial representado por um evento. Mostra-se que o desapontamento de expectativas de um agente está relacionado com o grau de convergência de expectativas de diferentes agentes e que a largura do corredor pode, então, ser definida a partir dessa convergência.

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