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# The structures of uncertainty: performativity and unpredictability in economic operations

Elena Esposito



**Abstract**

The paper reflects on the presuppositions and consequences of the concept of performativity (understood as the involvement of the observer in the objects and projects he/she describes). The paper proposes a broader notion of performativity, one that not only concerns theory but is also extended to the entire economy, which observes itself in all of its operations. This conception has the advantage of being connected with critical approaches inside economics, which highlight the central role of uncertainty and surprise. It can explain how and why performativity turns into counter-performativity and how financial operators exploit uncertainty when orienting their behaviour, expecting and using the unpredictability of the future.

Keywords: performativity; second order observation; uncertainty; risk; information; derivatives.

## Performativity and inclusion of the observer

In the last few decades, the notion of performativity has successfully spread throughout many different disciplines, often with great effectiveness. The concept originates in linguistics, where Austin's (1962) founding text, with its

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evocative title 'How to do things with words', marked a significant turning point. Austin's text shifted the focus from the abstract study of language to its use in practical communicative operations – from what language says to what language does (by saying something).[1] However, the performative component is not limited to language. Its implications are much broader. It highlights the need to abandon the idea of an external observer observing the world (and speaking about the world), without being involved in its processes.

This requirement coincides with what observation theory has stated for many years (von Foerster, 1981) and from which the theory of social systems took its starting point (with the term 'autology': Luhmann, 1997, pp. 16ff.) – the idea that the observer is always involved in the objects and processes he observes and describes. In hindsight, it seems fairly obvious now to ask how it could be otherwise. The answer is inevitably that the observer is in the one available world. He is also a thing and bears real consequences. We must determine what these consequences are and how they can be taken into account.

The concept of performativity is applicable to all disciplines in that it concerns not only language, but also observation in general. We could even say that this is the correlation in the humanities of Heisenberg's uncertainty principle in physics. In both cases, we are forced to face a world that depends on observation, on an observer belonging to the world. The result, in both cases, is a condition of indeterminacy (in the social sciences one refers to contingency)[2] which leads to a profound rethinking of the methods and categories of research.

The 'performative turn' has spread throughout the social and cultural sciences, from the study of rituals to the use of texts, from politics to theatre, from art to the media (Musner & Uhl, 2006; Wirth, 2002), and, of course, to science and sociology. The success of actor-network theory relies on its effective underlining of the performative elements in various aspects of social life and reflections concerning such life (Holzer & Schmidt, 2009; Knorr Cetina & Mulkay, 1983; Latour & Woolgar, 1979). In economic theory, the interest in performativity is quite recent (the standard reference is Callon, 1998), and yet the results are both particularly evident and immediate (Callon *et al.*, 2007; MacKenzie, 2009; MacKenzie *et al.*, 2007).

According to the original definition, 'economics, in the broad sense of the term, performs, shakes and formats the economy, rather than observing how it functions' (Callon, 1998, p. 2). Economics 'is not just about "knowing" the world, accurately or not. It is also about producing it' (MacKenzie *et al.*, 2007, p. 2). This production entails a thorough review of the methods and criteria of the theory. If performativity is taken into account, it is not enough to produce a 'true' theory, in the sense of a theory that adequately describes reality. As part of reality, theory also has consequences. Reality changes as a result of the theory. The 'true' theory only describes a reality that it has itself produced, and not what could have been (alternative realities).[3] Callon's question echoes this point: 'How can a discourse be outside the reality it describes and

simultaneously participate in the construction of that reality as an object acting on it?' (2007, p. 316). Critical theory claimed several decades ago (Horhkeimer, 1937) that what is required is far more than the development of a correct theory. It is about economics 'being ''able'' or ''unable'' to transform the world' (MacKenzie *et al.*, 2007, p. 2).

The problem is a complicated one. One can easily, therefore, become 'lost'. Strictly speaking, economics will always be 'able' to transform the world. In fact, it cannot do otherwise. Inserted into the world, economics inevitably affects the world with its observations and its concepts. What is sought is the ability to transform the world in accordance with what one wants, to transform the world in the 'right' way. This is far more difficult.[4] What criteria allow for this transformation to be steered, if they must themselves be part of the ongoing transformation? The answer to this question depends on the thoroughness and efficacy of performativity theory. This requires the ability to reflect on the theory and its presuppositions (the problem of contingency mentioned above).

This paper offers a contribution in precisely this regard. It looks at the applications of the idea of performativity in the economy, showing its advantages, especially in one sector, financial markets, where we continuously have to deal with inconsistent entities created primarily by the mutual observation of observers (second section). Mainstream economics, guided by the ideas of equilibrium, market efficiency and perfect distribution of information, is ill-equipped to deal with circumstances in which the relevant information is produced by the very behaviour of observers. One should re-introduce the observer into the object observed by theory[5] – a step which remains inaccessible to a theory that intends to offer univocal direction for guiding the behaviour of operators (third section). Even within economics, however, there are approaches that criticize the abstractness of prevailing attitudes and which stress the need to take account of the role of observers, their diversity and their interactions, as well as the relevance of time, novelty and surprise. Starting from a different tradition and from different problems, these remarks not only confirm performativity, but also introduce other aspects, such as the need to regard uncertainty as the fundamental resource and core of economic activity (fourth section). In order to take this into account, however, the notion of performativity in economic sociology is not sufficient. One should move to a more radical conception, one that is not limited to theory or the laboratory but extends to the entire economy, that economics observes an object that observes itself (fifth section). This radicalization has its advantages. For example, it allows us to explain how and why performativity turns into counter-performativity, a transformation that has thus far remained rather obscure (sixth section). The extended notion of performativity, referring to second-order observation, can also show how financial operators are able, at least in practice, to exploit uncertainty in order to orient their behaviour. Economic decisions are never random. They are guided by motives and projects. They often disappoint and behave

unpredictably. This unpredictability, however, can be expected (final section). The task of theory is to describe the preparation and management of surprises.

## Performativity in economics

It is fortunate that observations of economic performativity have been able to take place without the clarification of these underlying questions. These observations have led to many illuminating results in recent years. The most convincing research has emerged from the field of finance where the relationship of economic performativity with reality and the possible independence of reality is questioned. In the field of finance, the reference to reality is particularly vague and mysterious. The relationship between the real economy and the 'paper economy' (between Main Street and Wall Street, between the astonishing sums traded every day in the dizzying movements in financial markets and the goods that are actually available) remains obscure, not only for laymen, but also for specialized operators and observers. In this context, 'the material production of virtuality' (MacKenzie, 2007a, p. 372) has been revealed – that is, the way in which the practice of finance produces its own objects and makes them robust and social, even if they are entities that do not exist outside the practice of finance. Their reality is internal to the operations of markets, where they work perfectly in the organization of transactions and the creation and destruction of wealth. One speaks of entities such as LIBOR (the interest rates at which banks borrow funds from other banks), which do not exist anywhere as independent givens, but arise from the mutual expectations of banks on the offers of other banks. These are, therefore, conjectural entities, and are reliable terms of reference for operators (MacKenzie, 2007a, pp. 369ff.). They work together with equally 'immaterial' entities (such as stock indexes), primarily as a basis for derivative contracts.

Derivatives, the enigmatic products that marked the take-off of financial markets in recent decades, placed this relationship with reality into question, insofar as they have a mediated and circular relationship with the world. Derivatives are, in fact, so named because they have the particularity of 'deriving' from something else. Their price is calculated from the price of something else, the 'underlying', which can be anything – for example, natural facts like the amount of snowfall in a resort, the wheat harvest, the price of pigs, or other financial instruments like stocks, indexes, rates. From the viewpoint of derivatives, it makes no difference, because their object is not the underlying. In the traffic of derivatives, one does not sell the underlying, real (pigs) or virtual (indexes), but only a future binding, a more or less stringent promise (options leave more freedom than futures).[6] With derivatives, one buys and sells the risk exposure related to the transaction of the property in question, not the good itself. From this point of view, the good becomes irrelevant. Most derivative contracts close without exchanging anything. The underlying is not delivered at all. It is only the contract that is sold and then

used to exploit the price difference over time (the option is often not even exercised, because it is not profitable). In many cases, one never thinks of exercising the option because the contract was only concluded as a cover for an investment of the opposite sign. In other cases, the delivery is not possible because the contract dealt with inconsistent (virtual) entities.[7]

The object of derivatives does not exist. It is not a (real or virtual) present given, but a future entity (Esposito, 2011, ch. 9). It is not by chance that the present transaction takes place in reference to a future date. It deals neither with a present object nor with a future one, but with a present attitude with respect to the future, the uncertainty of tomorrow's risks, as they are perceived and managed today (Arnoldi, 2004, p. 23ff.; Bryan & Rafferty, 2007, p. 137). This risk is measured, compensated, transferred and split in a complicated and impossible attempt to shape the future, or at least its uncertainty.

In the context of derivatives, dealing with objects that directly reflect the expectations of the operators, objects which are measured and constructed on the basis of the expectations of others, the performative component is absolutely evident. Here, this kind of research proved particularly convincing. The most representative study is that of Donald MacKenzie (2006, ch. 5) on the Black-Scholes formula for pricing derivatives – a true concentrate of the riddles and efficacy of performativity. The formula represents an attempt in the present to give an objectivity (a price) to a future given, where this future has not yet arrived, and hence cannot be known, but depends on present operations – that is, on today's price. Callon's circularity here shows its most direct form. The object does not exist but for the intervention of the observer, an intervention that is doomed to affect it. MacKenzie has shown that the success of the Black-Scholes formula and its influence on the expansion of financial markets depended on performativity. Since the future does not yet exist, the present expectations about the future contribute to its production. For several decades these expectations have been guided by the Black-Scholes formula, which promised a rational, computable and shared form for dealing with the uncertainty of the future, projecting the uncertainty of the past forward (through the indirect calculation of implied volatility). The Black-Scholes formula promised to calculate the reality that it had itself produced, and not reality as such. This is shown by the fact that, in the beginning (when the formula was proposed: Black & Scholes, 1973), the procedure appeared utterly implausible, based on a series of absolutely unrealistic assumptions about the functioning of markets (as the authors themselves remarked). It was admittedly a flawed formula, which became valid when the markets (for many reasons, including its compatibility with the use of computers, which were spreading at that time) began to adopt it, 'believing' in the future reality promised by the formula and, thereby, making it real in the present. The formula produced the reality which validated the formula.

Performativity, however, works in both a positive and a negative sense, producing both successes and failures. The recent financial crisis highlights this. The mechanisms are the same. The future (not yet existing) remains open

and unpredictable, and can always come about differently than expected, as a result of these very expectations. In such cases, MacKenzie (2006, pp. 184f., 259f., 2007b, pp. 75f.) speaks of counter-performativity. The expectations objectivized by the Black-Scholes formula become visible. One can then operate against them, as happens when the trust climate of the markets changes and the future comes about differently from expectations – as a result of these very expectations. But this is not the only case. The failure of LTCM (Long-Term Capital Management) in 1998 has been interpreted as a reaction to its own success, which triggered an imitation process that falsified the (correct) calculations which were guiding it (MacKenzie, 2006, pp. 211ff.). One now increasingly refers to 'model risk' (Esposito, 2011, p. 189; Rebonato, 2001) in order to indicate the manner in which the use of models, especially if they are correct, tends to produce negative results. This is because reality reacts to the way in which it is observed. Some questions, however, remain open. Why and when does performativity become counter-performativity? Is the theory of performativity, which refers to the role of theory in shaping its reality, able to provide an explanation?

To look for answers, we must place performativity and its theory within the context of economics as a whole in order to reflect on its relationship to other theories and with the reflexivity of the economy in general.



## The exclusion of the observer from economic theory

Why is performativity so evident in economics and why does it lead to such enlightening results? One reason is undoubtedly that economic theory, despite the results from theories of science and other disciplines, continues to be based on some assumptions which explicitly exclude any form of involvement of the observer, and even locate him/her more or less consciously in an external position. Only thus is it possible to preserve an abstract idea of an economic rationality that is guided by fixed criteria which can be described and formalized, without taking the constraints that arise in specific situations into account, situations in which the operator is not alone and must choose a behaviour that will prove appropriate or inappropriate, depending on how others act (who are in the same situation). Only by keeping the observer outside can one maintain assumptions such as the hypothesis of market efficiency (EMH), which was developed in the 1960s and was widespread in the decade that followed (Fama, 1970). This hypothesis posits the idea that market prices, particularly those in financial markets which are assumed to be maximally efficient, always reflect the available information, compensating for over-reactions and under-reactions up to a condition of equilibrium and optimal distribution of resources. The movements of markets must therefore be random (for the random walk hypothesis (RWH) see Lo & MacKinlay, 1999; Malkiel, 1999) and variations must be unpredictable. Otherwise, markets would already have exploited and neutralized any opportunity. Rational

markets move without reason. There is no information which is not already incorporated into market prices. Deviations from the rationality of markets, when present, are labelled as anomalies or even as market failures (a label that is inherently judgemental).

If performativity is introduced – that is, the intervention of the observer in markets in which he operates – these abstract hypotheses become empty. Markets cannot reflect all information because they lack, at the very least, the information produced specifically by operators through their behaviour and the observations of such behaviour by other operators (MacKenzie *et al*., 2007, p. 5). The actual behaviour of operators implies a certain predictability of markets due to the way in which the forecasts of experts, who are trying to find patterns and trends, affect the movements of the markets (Preda, 2007). Irrationality is not only rational, but also has structures which can be described (for example, by behavioural finance; see Kahneman *et al*. (1982) and many others, like Motterlini (2006)).

All of this seems to be ignored by mainstream economics, undoubtedly because the task of mainstream economics is not only to describe economic reality, but also to provide information that can help orient the behaviour of operators and, ideally, offer forecasting tools (Smelser & Swedberg, 1994). Economics is included within the object it describes. Paradoxically, its performative role prevents it from seeing performativity. The theory must affect the behaviour of operators by providing a description of the economy and its functioning. If the theory attempted to take account of performativity and the resulting uncertainty, it would fail to do so. Its task would become all the more complex. An internal observer who is aware of his influence on the subject he describes is lost in circularity and can no longer give univocal indications (Baecker, 1988, pp. 52–3). The task of economics is self-limited in advance. Like all theories, it must face problems and compare different solutions. In so doing, however, it cannot place the distinctions which are taken for granted within the economy into question. For example, it cannot compare them with distinctions that have been developed in other areas, such as politics or science (Luhmann, 1997, pp. 964–5). It must observe the economy from the inside, and this as though it were an external observer.

Highlighting this limitation, performativity theory correctly criticizes the mainstream approach of economics. However, the mainstream approach is not the only one, and economics itself has produced a long history of divergent voices, which, even if they failed to speak of performativity explicitly, have reflected on the reflexivity of economic behaviour and the uncertainty it generates. If one is not bound to the name, then the hypothesis of performativity has many precedents within observations of the economy in the context of the many different theories that have criticized the rigidity and irrealism of a perfect market and its corollaries. This is not, of course, a criticism of the theory of performativity. On the contrary, it is a further demonstration of its empirical adequacy. The observations of the economy, from within the economy, also point out aspects which could lead to a

radicalization of the hypothesis of performativity by making it stricter, and, at the same time, overcoming some of its difficulties.

## Uncertainty as a resource

Criticisms of the abstractness of economics are not new, especially in economics. Keynes was quite explicit: 'The classical theorists resemble Euclidean geometers in a non-Euclidean world who, discovering that in experience straight lines apparently parallel often meet, rebuke the lines for not keeping straight' (Keynes, 1973 [1936], p. 16). The trend towards mathematization rests on imprecise assumptions and leads researchers to lose sight of the complexity and interdependencies of the real world (Keynes, 1973 [1936], p. 298). These criticisms have recently been resumed and strengthened. Economics would be plagued by an excess of formalism without theory, which makes it all the more abstract and detached from its object. The result is the 'crisis of vision' (Heilbroner & Milberg, 1995) of an 'esoteric' theory speaking about an imaginary hypothetical reality which does not face the data of reality, but merely demonstrates that the real world confirms its predictions (Blaug, 1980) (a kind of distorted recognition of performativity). The detachment from reality is explicit, given that economic theories refer to variables that must be few in number, homogeneous, permanent and isolated from the rest of the universe, which is never the case (Shackle, 1972, pp. 74ff.). These theories are inevitably subject to errors and ambiguities (Hicks 1979, ch. 1), if they are not outright false (Zamagni, 1982, p. 13), serving only to remove or neutralize the social factors which generate uncertainty and instability, putting rigour before relevance (Heilbroner & Milberg, 1995, pp. 101–5).

Such references are in no short supply, and curiously come from within the very field of economics they aim to criticize. It is as if they realized a kind of performative self-immunization (as if the awareness of the problem were already a part of its solution). The typical 'syndromes' of economic theory, like the obsession for equilibrium, share the same base and are equally unrealistic. von Hayek said that the state of equilibrium is 'admittedly fictitious' (1937, p. 44), but is still presupposed because it allows us to build a reliable theory, one free from uncertainties, one where subjective factors coincide with objective ones (and we could, therefore, disregard subjectivity, i.e. the role of the observer). Such a theory has no surprises (Hicks, 1979, p. 101), no novelty, no time (Clark & Juma, 1987, p. 5; Rizzo, 1979, p. 5; Shackle, 1955, p. 91, 1988, p. 8). There are not even interactions or mutual observations of different individuals (von Hayek, 1937, pp. 35ff.). Equilibrium would make sense only if operators, who are free to follow their individual plans and preferences, would all follow the same logic and rationality, expecting others to do the same – as if different individuals were finally equal in their criteria and orientations.[8] This rationality would not change over time. While the decisions can be different, as new elements are acquired and we learn from our mistakes (greater knowledge

and different constraints), the basic logic would not. Here again it is as if there was only one individual (and therefore no concrete individual, because real people are always different) who in certain situations, with certain information and from different perspectives or at various times, always uses the same rationality. In the terms of performativity, economics does not take account of the way in which the concrete perspectives of different observers affect the world they observe, as if the observers were outside and faced a world that did not also contain the subjects as objects inside itself.

The critical reflections within economics, however, say more. They introduce elements of complexity that the theory of performativity failed to highlight with the same clarity, in a certain sense radicalizing criticism, as an attempt to offer a way out of the stalemate of their own discipline. The key word is *uncertainty*, understood in a positive sense as a resource. Uncertainty is the basic resource of economic behaviour and of the possibility for obtaining profits. The world of the economy, Shackle (1972, p. 164) says, feeds on uncertainty. It is an unavoidable and uncontrollable uncertainty, one that is produced by the very behaviour of operators.[9] Without uncertainty, the economy could not function or exist. In a world of rational and efficient markets, one would not be able to earn or invent anything, because any novelty would be neutralized in advance by the perfect distribution of information. However, a genuine entrepreneur produces surprises, invents novelties which could not be predicted in advance because they introduce a point of discontinuity, a 'crucial moment' in history that creates opportunities which did not exist previously. These possibilities cannot be planned, and they produce the persistent uncertainty of time as well as the creativity and dynamism of economic behaviour. A decision does not only choose between pre-given possibilities, establishing which ones are the most convenient, but creates new opportunities which prove unobtainable from the available data. The decision exploits uncertainty, without which there would be no freedom, and at the same time reproduces it, regenerating the unpredictability of the future (Davidson, 1978, pp. 5–10; Snowdon *et al.*, 1994, pp. 300ff.). Uncertainty, we could say, is the other side of creativity and innovation. This fact should be both understood and appreciated.

Uncertainty means, first of all, that no one ever knows how things will actually transpire. This framing posits, like the efficient markets hypothesis, that the central element is information. In this case, however, information is never perfect, nor should it be. The imperfection of information is not a defect (or a 'failure') of markets, and cannot be overcome with greater knowledge or better techniques. Imperfect information is the physiological condition and reason of markets.[10] This is the starting point for 'information economics' (since Stigler, 1961). Economic problems are problems concerning information. Without such information problems, there would be no economic problems (Clark & Juma, 1987, p. 90). Information is always lacking because it is not a prerequisite for, but the result of economic action.

Although not presented in these terms, this is again a matter of performativity. Even if the market is well regulated, prices never express all possible information, given that they cannot contain the most relevant information concerning the markets in which operators observe each other and try to modulate their behaviour on the basis of what others do (or fail to do). The most relevant information does not relate to the features of goods, but to the orientation and expectations of others. This information is not contained in prices, but is produced by the behaviour of operators who are oriented to prices (Grossman, 1976, 1989; Stiglitz, 2003; Grossman & Stiglitz, 1980).[11] This information cannot be known in advance because it does not yet exist. A free and efficient market is, therefore, doomed to be imperfect. This is shown by the recent insoluble puzzles of economic reflection, which are all due to insuperable information deficiencies. Adverse selection is produced when the relevant information is derived from the behaviour of the counterpart who is in the know and behaves accordingly. For example, I have a used car to offer on the market, and I know that the potential buyers are aware that they cannot know if it is a good car or a 'lemon', and therefore fail to trust me (the classic 'market for lemons' of Akerlof (1970)). They will accept only a low price that corresponds to a low-quality product. This is not convenient for those offering a good car. There is therefore no market for good-quality used cars. The market 'fails' in that it fails to convey the correct information, showing the information that actually guides it, information which is not relating to goods, but to deductions of what others know and think. A similar situation occurs in cases of moral hazard, which are well known in the debate concerning possible interventions for controlling the financial crisis. The measures taken to support banks are interpreted, on the one side, as signals that they are needed – that is, as indexes of the weakness of banks. On the other side, these measures are anticipated by banks, ultimately driving them to take more risks. In neither case does one succeed in conveying the relevant information because a circular mechanism becomes established and generates further information related to the mutual observation of observers who are always involved in the market in which they operate.

These negative cases highlight the (positive) mechanisms acting on markets at all times. The operators decide not only on the basis of what they know and what they want, but also on the basis of how others will observe their decisions and how they will act. They recognize that it is the behaviour of others that will ultimately determine whether their decision is right or wrong. This happens in all economic transactions and is the real purpose and function of the market – that is, to provide an arena for the mutual observation of observers. The market works as a double-sided mirror, where producers observe themselves and other producers and consumers do the same on the other side (White, 1981).[12] They do not see through the mirror. They do not see the products. They see only how others refer to them. Performativity is the rule and meaning of economic action. It does not only concern theories which try to interpret it and their practical impact. Any behaviour, any idea, any

purchase and any investment, all are included into a reflexive circuit which affects the reality to which they refer. Observed from within economics, performativity becomes far more radical and pervasive, no doubt because it expresses the basic function of the economy – that is, to highlight and exploit uncertainty, producing and reproducing it in all of its operations.

From this point of view, the obsession with rationality appears particularly limiting. While it is true that, in conditions of performativity, one cannot invoke an abstract rationality that applies to all circumstances, it is also true that one does not lose anything, because in concrete situations it is often far more rational to behave in ways that are formally considered irrational (Arrow in Swedberg, 1990, p. 159). A rational choice can have negative consequences, because it is predictable. Others can anticipate it and purposefully behave in a different way. In markets of observers observing themselves, there is often a different rationality at work. Luhmann calls this form of rationality risk rationality, which 'is correct when the strategy of the others is wrong and wrong when the strategy of the others is correct' (1988, p. 120).[13] Profit relies on the ability to deviate from expectations. It relies not only on doing what others fail to expect, but also on changing the rules of the game during the game – that is, creating genuine novelties that cannot be expected.



## Performativity radicalized

How does the hypothesis of performativity change if we take the critical voices from within economics into account? On the one hand, it certainly strengthens. It confirms circularity and the role of the observer in the reality he observes. On the other hand, however, performativity is radicalized, in a kind of doubling that extends to all economic transactions. Economic operations generate the reality in which they operate and the unpredictability they face as a result.[14]

In its original formulation, performativity concerns only economics and its relationship with reality. In its use, however, this restriction has become more and more evanescent. Similarly, in language theory, the distinction between constative utterances (which merely describe the world: 'the apple is red') and performative utterances (which produce concrete effects in the world: 'I pronounce you husband and wife') initially seemed clear. However, it was then noticed that performative utterances must necessarily talk about something (they have a constative component) and that constative utterances always have practical effects. Besides describing the world, constative utterances also happen in the world. They are uttered by someone, are understood and have consequences. Research, therefore, moved to the complex classification of various kinds of speech acts (Searle, 1969) and to studies presupposing a general performativity.

Something similar occurs in the observations of the economy. A formula like Black-Scholes, which initially appeared constative, proved to be performative when the conditions of the economy changed (Callon, 2007, p. 321), raising the suspicion that all observations are performative. It was quickly recognized that not only theories (the perfect market hypothesis and its derivatives like CAPM or VaR), but all sorts of economic factors shape the economy, such as the technical equipments and graphical representations used in the markets or support practices like accounting techniques (Chiapello, 2008), the rating systems of credit agencies (Sinclair, 2010) and countless other factors. The notion of performativity stretches out of proportion, and additional specifications are introduced in order to deal with this. Several 'modes' of performativity are distinguished, from the explicit performativity of theories to those 'embedded' in tools and formulas, in institutions and technology, 'generic' performativity (which maintains the appearance of constativity) and 'effective' performativity (which makes a difference in the markets) (MacKenzie, 2007b, p. 60). How do we draw this distinction between implicit and explicit performativity? When do we switch from the one to the other? Who sets the threshold? What is the specificity of theory?

If every economic operation is performative, then the difference between theory and practical operations is diluted and the boundary between the place where science is produced (the laboratory of actor-network theory: Knorr Cetina & Mulkay, 1983; Latour & Woolgar, 1979) and the 'outside' society weakens. In the economic reality, there is a continuum between 'laboratory', with its clear boundaries between 'interior' and 'exterior', and 'in vivo experiments', which occur directly in the outer reality, with different 'platforms' in between, which are more or less flexible and open to the contribution of external persons (Muniesa & Callon, 2007, pp. 163ff.). Because every economic operation uses devices and techniques which incorporate theories, the scope of economics broadens and cancels the distinction between 'academic economics' and 'economics at large'. Every empirical operation is itself theoretical and vice versa (Callon, 2007, pp. 330ff.). At most, one can distinguish between 'confined economics' and 'economics in the wild', which are connected with other disciplines, management and practice (Callon, 2007, p. 336). The radicalization of this position leads to the notion of 'economization' (Çalişkan & Callon, 2009), stating that the economy, in general, depends on economics (Çalişkan & Callon, 2009, p. 372). Every behaviour, object, or institution becomes economic only when economics defines it as such. It is therefore 'impossible to study the economy in the absence of the theories that discuss them' (Çalişkan & Callon, 2009, p. 377). Economics becomes so extended that it completely overlaps the economy.

In accordance with the intention of its proponents, the outcome is the consistent evolution of the classic idea of the 'embeddedness' of the 'new economic sociology' (Granovetter, 1985, up to Fligstein, 2001). Economic theory is not external to the economy. It does not study it from outside but is itself part of the object it analyses. This, as we have seen, is now taken for

granted in many fields of research. It expresses the dependence of the observed world on the observer facing it. According to an old formula of Humberto Maturana and Francisco Varela, 'Everything said is said by an observer' (1988, p. xix). Reflecting on the contents of each statement, one should also take account of the observer formulating it. The hypothesis of economization, however, goes further. Not only does it say that the theory is an observation and that observations affect the observed object, but it also says that every observation is a theory. Whenever an economic observation takes place (in every transaction, every budget, every product study), with its consequences on the economy, one should speak not only of observation, but of theory. This is a consistent extension of the original definition of performativity as found in Callon (1998). Economics performs the economy. When performativity spreads, the scope of the theory broadens and eventually coincides with the economy as a whole. Strictly speaking, the new definition should be that the economy performs itself. However, such a definition forfeits all references to theory.

Besides stretching the concept of theory until it loses every border, this extension forfeits the radicality of this approach. If everything is economics, and hence everything is theory, what is the role of sociological theory? How does theory direct observation? The theory of performativity is necessarily performative. However, how does it take account of the (performative) consequences of its observation? According to the theory of economization, something becomes economical only when economics defines it as such, and the embedded theory is itself part of the economy. However, where is the theory of economization located? Is it within the economy or outside it? Who defined it as economic? How does it relate to other theories? Where is the theory that establishes the difference between academic economics and economics in the wild, in the academy or in the wild? The problem is not only one of definition, but also concerns the way in which one works with theory and the consequences which derive from it. For example, it concerns the relationship between the sociological theory of performativity and the reflections of economics, which, as we have seen in some cases, recognize and enhance the reflexivity and the informational role of observation.

In its own way, economics recognizes embeddedness. It does so in a more radical version, starting from the opposite direction, not from the laboratory to society (viewed as a kind of extensive laboratory), but from society to the laboratory (which becomes an articulation of society, one of its internal formations). Every economic transaction, according to Shackle (1972, p. 96), is a decision – that is, a choice between alternatives. However, these alternatives are not the elements of a closed list given in advance. The decision-maker generates the options he hopes to achieve with his own choice, with guesses and imagination, options which did not exist before his decision. Production and innovation (practice and theory), then, are part of the same process, as each economic action produces information which is used by producers and consumers to conceive of new possibilities (Clark & Juma, 1987, p. 96).

This happens in every aspect of the economy: in the ways in which companies take account of the asymmetries in information; in competition, which is never absolute but relative to others (operators observe each other); in the possibility of monopolists to differentiate different categories of buyers; in efficiency wage theory, according to which productivity depends on salary and not the other way around; and, in countless other examples (Stiglitz, 1985, pp. 30ff.). The uncertainty of theory, which can never have an independent verification, corresponds to the uncertainty of the subjects, who cannot know whether their expectations correspond to reality or reality conforms to expectations (Soros, 1987, p. 46).

The entire economy, therefore, is performative because it is based on uncertainty which is exploited in order to produce possibilities. The distinction between theory and economic action, then, must be far more subtle, and cannot rely only on the performativity of theory, given that performativity is everywhere (not only in devices that incorporate theory). Not only economics, but all economic transactions, observe the economy and produce information. Economics is the theory of an object that observes itself (Luhmann, 1988, p. 80).[15] What must be studied is observation and its forms, as well as theory as a particular modality of observation.



## Counter-performativity as second-order observation

Performativity intervenes in all the operations of the economy, a fact that social constructivism has known and signalled since the times of Berger and Luckmann (1967). Social facts are constructed by observers, who then fail to recognize the role of these facts in this construction when they encounter them in an objectified form as objects independent from their contribution. In this sense, performativity is not specific to economic theory. It is not even specific to theory in general. All social operations have a performative component, insofar as they contribute to the building of the world which they later have to face. Observation theory (von Foerster, 1981), however, distinguishes first-order observation, or observations of objects, from second-order observation, where one observes observers and the objects they observe (their worlds). Since the world of every observer refers to his perspective, this approach includes the issue of performativity (the world of each observer is 'his' world 'constructed' by his categories and his operations), and also takes account of the ways in which observers observe and affect each other. The world of second-order observers consists of objects as well as other observers, with their respective worlds, where the first observer can appear as an object (and be aware of this fact). The theory of social systems integrates observation theory in a complex description of modern society and its structures, a theory of society which can be seen as a description of performativity at a higher level of complexity and self-reference (Luhmann, 1997).[16]

In terms of observation theory, performativity is not exclusive to theory. All social operations, which are observations, affect the world. Performativity is the fundamental given of the social as a whole. The availability of a theory, however, makes a difference and has another performative effect, one which is more subtle and insidious. If the theory spreads and operators follow it, then it makes it easier to see how others observe; it directs second-order observation. If observers follow a theory, then one can know what they observe and how. One can observe their observation and behave accordingly. This is the form of performativity specific to theory that has been studied and analysed by economic sociology.

This 'second performativity', however, is particularly uncertain. It not only concerns the ability of the theory to transform the world (every economic operation does this), but also the way in which observers observe each other, and observers (unlike the world) have a certain freedom with regards to this observation. They can follow others and act like them, or they can choose to deviate, operating differently because they know what others are doing and observing. At this level, it becomes impossible to predict how the transformation will go. The 'second performativity' can transform at any moment into counter-performativity.



As long as one follows the definition of performativity provided by Callon, counter-performativity remains inexplicable. If the world is constituted by theory, then one is unable to explain why, at a certain point, it begins to be de-constituted by theory, with no interference from a competing theory constituting the world in its own way. Why does the effective power of theory turn into its opposite? Why does performativity turn into counter-performativity? If one considers this second-order performativity (the observation of what others observe, a fact that can be observed), then the construction can take one of two opposing roads, both of which confirm the inescapability of performativity. The observer does not merely observe what others observe, but also observes that they observe. The observer can keep a distance, choosing whether to follow his/her observation (thus reinforcing the effect of performativity) or to deviate, looking for other advantages (thus producing a counter-performative effect). Counter-performativity is the other side of performativity, and is inevitably produced along with it whenever an observer observes the effects of observation on the world (that is, observes performativity itself).

Financial markets (and, in particular, derivatives markets) offer clear examples of these mechanisms. Operators observe other operators and their mutual observations, and the world becomes nothing more than an indirect reference. Financial markets are performative markets where performativity is sold. If one tries to explain the movements of derivatives by referring to the value of goods and their trends, then one becomes lost in the seeming irrationality of erratic and unintelligible movements. What are handled in financial markets are not the goods or their values, but the expectations of operators with regard to the trends of these values, trends which are always

uncertain and unpredictable and depend on expectations. What is handled in financial markets is uncertainty as such, resulting from a network of reciprocal observations of observers. Each observer observes others doing the same, and knows that he too is being observed. What everyone expects depends on what an observer expects others to expect, and their expectations depend on what is expected from them. Information economics shows this, up to and including the extreme cases of adverse selection and market failures.

This reciprocal observation is oriented and strengthened by theories (should they spread and be followed), as was the case with the Black-Scholes formula that allowed uncertainty in the form of risk and its pricing, which then in turn allowed for risk to be exchanged in markets. It formed a specific object and, together with it, the markets that sell risks and risks of risks. In the financial markets of recent decades, one sells the risk of risking, ultimately risking again. Eventually, what circulates in markets is not the risk connected with a specific investment (the risk of incurring a damage should the dollar fall or the price of copper increase), but an abstract threat that no longer has any relationship with the initial goods, a 'commodified risk' (Bryan & Rafferty, 2007, p. 136; Arnoldi, 2004, pp. 23–6) that reflects the ways in which observers observe each other (LiPuma & Lee, 2005, pp. 407ff.; Pryke & Allen, 2000, p. 267).

According to the classic definition of performativity, this is evidently a performative effect. Theories produce an object (risk objectified in the form of volatility) and offer it to the markets which price, sell and resell it, and transform accordingly. The theory generates the object it has to deal with when it studies its world. The world, as MacKenzie showed for the Black-Scholes formula (the one which allowed for the measurement of volatility), adapts to the theory, changing in such a way as to correspond to the assumptions of the theory describing it.

How can we explain counter-performativity? Why did performativity at one point stop working and turn into positive feedback producing adverse effects? The theory was always the same, and the critical voices, which have always been there, were no stronger than they were during its success. The external factors, as in all cases, are not sufficient to provide an explanation of the change in attitude. It has been noted several times that markets are able to withstand great changes, and that they inexplicably collapse due to far less significant events. In the case of the financial crisis connected with sub-prime mortgages, the trigger element was not a multiplication of insolvencies (Sinclair, 2010, p. 6), but rather the fear that this could happen. The increase in the cost of money and the slowing of the growth of the real estate market in the US do not explain the huge turbulence of financial markets, even in areas which are far away and largely independent. The markets have clearly responded to themselves more than to the world, and have not just responded to theories, which continued to promise to control risks (in many cases it was noted that investment models were abandoned before they could prove profitable, even those which likely would have worked).

The second level of performativity comes into play at this point. The economy reacts to itself, and not only to economics. Operations observe other operations, as well as the theory itself (as it is incorporated into these operations), and then draws consequences. In the case of the Black-Scholes formula, the strong performative effect did not stem directly from the fact that it was used (we know that it was initially totally unrealistic). Performativity took off at a second order, when the formula was popular and used to observe what others who were also using the same formula (and this was known) observed. The financial world became a 'Black-Scholes world' when operators observed that others were successfully using the Black-Scholes formula for directing their operations because they observed the observers and not simply the world (which then, in turn, complied). At this level, observers not only observe what others observe (this always happens), but also that they are observing and how – that is, they observe the models that are used to guide observation. However, the observer who observes the use of models has a certain distance from them. He can compare them with alternatives and is not obliged to follow them, even if he sees the world they observe. Here, model risk arises, which is not due simply to the use of models, but to the observation of the use of models, and the decision whether to follow their directions or deviate from them. If there were no models, then this observation would not be possible. Hence, it depends on models, but it does not necessarily confirm their predictions. At the second level of performativity, the theory creates reality, but not necessarily the reality that the theory predicted. Again, it is here that counter-performativity can arise.

The distinction between the two levels of performativity can be clearly seen in reference to time. Not only is the present world performative, in the sense that it depends on observation, but the future is also (performatively) constructed by a present that is trying to predict it (Snowdon *et al.*, 1994, pp. 52ff.). These two performativities do not necessarily follow the same direction. What will be realized and possible in the future depends on what one does or fails to do today. It is, therefore, unpredictable. The future, even if it comes out of the present, is not determined by the present. It remains open and can react in many different ways to the bindings of this past. The sociological term is 'future present' (Esposito, 2011, pp. 23ff.; Luhmann, 1991, pp. 48ff.). What will become present in the future is different from all futures that we can imagine in the present (the 'present futures'), even if it results from the ways in which the present tried to anticipate it. It is a different performativity, one that cannot be controlled by simply observing the performativity of theory.

The financial crisis showed this. It occurred in a market which had raised performativity to its highest levels, a market that was reacting primarily to itself and its expectations, a market that was driven by models led by these same expectations (in the form of implied volatility: Colombo *et al.*, 2006, p. 186; MacKenzie, 2006, pp. 166ff.; MacKenzie & Millo, 2003; Mandelbrot & Hudson, 2004, p. 75; Millman, 1995, p. 47). The problem, as the crisis showed, is that

implied volatility is not the future volatility but the present foreseeing of it, which the future is not obliged to follow. The present use of the future acts upon the future, increasing the risk that it will come about differently than expected. Risk calculation models calculated all possible futures, except the one resulting from the fact that markets use these models. This future could not be foreseen, because it results performatively from the very diffusion of (performative) models. The models correctly predicted the evolution of markets with no use of models, but were not able to take into account the possibility that the future would react negatively to the prediction itself (to the model). Here arises the specificity of the second level of performativity, which is not simply a doubling of the first form of circularity. It is not enough to observe the present vision of the future. One should also consider how this vision is observed and how it changes the way in which information is produced. It is a different performativity.

To state this more concretely: the crisis was not simply due to the fact that the market was configured (produced) by theories (which it always is), but that it began to observe this production. The theories that produce the world are themselves objects in the world. They are observed in operations, and this in ways that they cannot control. The models projected a future course for markets, one which markets observed and contributed to. An example is the confidence in the growth and control of risk in the decade after 2000, which increased the growth of and propensity for risk. However, the idea of controlling risks was also observed, ultimately generating information. This changed the criteria for processing information. Information was evaluated with different criteria, which could not be predicted by the previous models. These could include all possible information and its increase, but not how the new information generated by models would change the way we process information.[17] This specific information was inaccessible in the past and could not be considered. However, it is the information that acted performatively to build the future present that the crisis had to face, and for which it was not at all prepared. The models foresaw all risks, except those arising from the use of models.



## Non-random uncertainty

Besides an explanation of the enigma of counter-performativity, what else do we get when we observe markets with a broader and more circular notion of performativity (that performativity itself works performatively)? Or, more generally, what do we get when we observe markets in reference to second-order observation?

As we saw above (under 'Uncertainty as a resource'), it becomes possible to connect the results of economic sociology with the reflections on circularity and uncertainty within economics, which are not limited to theory, but involve all operations and the very meaning of the economy. From this perspective,

uncertainty is seen as a resource, as the engine and stimulus of economic activity, allowing for the development of creativity and the generation of novelties. Uncertainty explains the continuous production of surprises and genuinely new information, not simply additions, and then changes their meaning and relevance. Uncertainty also explains the possibility of profit and business, which always have to do with creativity and inventiveness. An extended concept of performativity allows us to capture and enhance this aspect. The extension of uncertainty as a basic element of the economy does not create a more chaotic or unpredictable situation, but, to the contrary, allows us to identify structures, which, of course, do not determine the world (where would uncertainty end?), but control the way with which the openness of the future is dealt. This approach, however, requires the forfeiting of a key resource of economic theory, the use of *randomness*.

Randomness is the presupposition of classical economics (the idea of the efficient market and the random walk hypothesis). One could say, paradoxically, that it is only if randomness exists that markets can be perfect – that is, it is only if they rely on disorder that they can be ordered. The origin of the movements of markets must not be reason (which their efficiency would have already nullified), and their movements must therefore be random. So understood, randomness becomes the opposite of uncertainty. If one starts from uncertainty, then one must abandon randomness. The idea of uncertainty does not imply (like randomness) a lack of reason, but the impossibility of control. There is always a reason. In fact, there are many reasons and they all have consequences. However, this does not mean that things will go as one wishes. Without a reference to motives, predictions and expectations, one cannot explain what is going on (even when such goings-on deviate from these expectations) and cannot prepare to react properly. If there are reasons, however, then there is no randomness. People do not decide by chance, they decide on the basis of the available information.[18] How can we abandon randomness without giving up structures, describing a world that is unpredictable without being random, which is produced by the motives and decisions of operators but is always surprising? Can we describe the economy by starting from uncertainty and its forms?

Benôit Mandelbrot (Mandelbrot & Hudson, 2004) tried criticizing, in the field of finance, the assumption of random movements of prices – that is, the idea that any variation is independent from those which preceded it because the prices of securities faithfully reflect all information. Markets have no memory. This is the assumption underlying financial formalization, which allows for a description of the variations of prices with a Gaussian curve (the normal distribution of probabilistic calculations) and an estimation of the movements of risk (volatility), which are then sold and resold on the basis of these models. Although prices are unpredictable, it is assumed that their oscillation can be described. One does not know if they will rise or fall, but one can predict the extent to which they will move. In other words, even if the

future is unpredictable, and hence risky, it is assumed that risk can be predicted with probabilistic models.

The crisis, however, contradicted this predictability, to the extent that events occurred that were so improbable ($1:10^{50}$) as to be virtually impossible.[19] Risk behaved unpredictably. Volatility does not move in the orderly way presupposed by models, but shows its own volatility, which is expressed in the much discussed 'volatility skew' (MacKenzie, 2006, p. 202; MacKenzie & Millo, 2003): a pattern in the graph of volatility which shows that, contrary to expectations, markets apparently expect improbable events to occur. The calculus of probability, which is the basis of all models of risk management, makes sense only if one assumes that probability is probable. However, under certain conditions, it seems that financial markets do not agree[20].

How can we explain this strange situation? We once again turn back to performativity, but this time to its radical version, which refers to performativity itself and shows that uncertainty binds itself, even if it leaves the future completely open. Uncertainty is not accidental, although it remains unpredictable. According to Mandelbrot, it is not true that changes in prices do not have a structure. They have their own memory, and, therefore, what happens today influences what will happen tomorrow. This influence, however, is neither regular nor predictable. The process also changes over time, and seems to 'learn' from experience and alter its patterns. Not only does it remember previous information, but it also uses such information to change the criteria with which new information is evaluated.[21] This structure concerns the variability of prices (volatility), which does not follow the Gaussian curve. The extreme values are too numerous and far higher than the theory predicts (Mandelbrot & Hudson, 2004, pp. 97, 122). The movements of finance, then, are far more unpredictable than what risk management models promise, not because they are accidental or totally irrational, but, to the contrary, their unpredictability comes from the fact that operations have structures and dependencies, because they observe previous operations and their criteria (in this case the risk management models) and take them into account when building their expectations.

Unpredictability is so radical that it includes both the failures and the successes of the forecast. This feeds the feedback loop at the base of prophecies, which, as ancient divinatory cultures knew (Esposito, 2005), are always effective because they affect the vaticinated world. They can be self-fulfilling (as in the case of Oedipus, who realized his fate by trying to avoid it) or self-defeating (as in many cases of planning and reform: Merton, 1936), but they are always a consequence of the facts that were formulated. The prophecy does not decide the future, but structures it in the distinction between confirmation and non-confirmation. It is no longer an indeterminate field of expectations, but the space of an alternative (yes or no). This has consequences. The world after the prophecy is not the same as the one before, whether the prophecy is fulfilled or not. A probable course can become improbable because it was expected – but it can also become all the more likely

for the same reason. Counter-performativity is the other side of performativity, neither more probable nor more improbable. The evolution of financial markets shows both trends – first, an acceleration of risk because everyone followed the models that promised to manage it and, then, a rejection of any risk-taking in reference to these same models.[22]

Probability has nothing to say about this. It would not make sense to reverse the attitude, focusing on the occurrence of improbable rather than probable events. What the radicalization of performativity shows are the limits of the probabilistic orientation as such. It does not simply show that it is probable that improbable events occur, but it shows that the same distinction between probable and improbable is improbable in practice (Esposito 2007; Maurer, 2002, pp. 24–9). Only uncertainty remains, which cannot be overcome but, in this radical version, can be observed and used for orientation. Uncertainty remains the fundamental resource of economic behaviour. It is an uncertainty without randomness, which becomes even more radical insofar as it derives from intentional behaviour and projects which are observed and increase the complexity of the world.

What would it mean to observe this kind of uncertainty? An example of such observation is seen in the behaviour of many operators struggling with a highly circular and self-reflective financial market, who choose to observe this reflexivity and take it into account in their decisions (George Soros (1987) made a kind of theory out of this). More experienced operators have a free attitude towards theories and models, and, while they do not believe in them, know and use them. Preda (2007) studied the case of financial chartists who officially use techniques to predict the future prices of securities by tracking past patterns. These often proved profitable. Apparently it is a very naive theory, as we know that the turbulence of markets excludes any continuity between the past and the future. However, these operators place themselves at another level. They succeed, not because they guess their predictions (which are of course always uncertain), but because they use them as a tool for intervening in the market, triggering trends that they can follow in order to generate further information. They use them in a performative way. The relevant information is not that which is contained in the model, but that which is provided by its use and then used to decide (often differently from what the model would have predicted).

It is, in a certain sense, the inversion of 'model risk', which then becomes an opportunity for exploitation. The open, circular and constitutively uncertain markets have structures one can refer to in order to observe their trend and to observe how the future deviates from predictions (Beunza & Garud, 2007). Shrewd operators observe these structures, which do not behave probabilistically, given that they do not rely on randomness, but on the way the world is being configured by the active intervention of operators. Probabilistic techniques are useful in orienting the observation, not the decision. They actually describe what is reasonable to assume others to expect. However, the decision, precisely because it remains aware of this, often chooses otherwise.

The techniques do not contain the information, but are used to generate information in a non-random way.[23]

In describing these configurations, the concept and theory of performativity can make a great contribution. If one abandons the idea of a world which is given, described and observed independently from the ongoing observation, then one must also abandon any reference to randomness and every naive probabilism. In this case, the acknowledgement of uncertainty does not mean the renunciation of any criteria, a generic 'anything goes', but the search for more complex and contingent criteria, generated performatively by the ongoing operations, which cannot be generalized but work effectively and direct decisions. Because operations continually produce new uncertainty, the management of uncertainty does not necessarily have to be uncertain. For a theory at this level, however, the very idea of performativity must be radicalized and turned back onto itself, solving some problems (the clumsy distinction between different types of performativity, the difficulty in fixing the boundaries of the laboratories with respect to the wild economy, the relationships between agents and 'sociotechnical agencements': Callon, 2007, p. 319; MacKenzie, 2009, pp. 20ff.), but giving rise to many other and far more complex ones.[24]



## Notes

1 See Austin (1962) and Searle (1969), as well as a wealth of literature on speech acts and their various aspects, for instance, Grice (1975) and Cohen (1973) among others.
2 Following the definition of modal theory, according to which something is contingent if it is neither necessary nor impossible. It is there, but could just as easily not be or be different.
3 In a very empirical context, this is confirmed by Hull (1997, p. 507) (one of the most popular introductions to financial derivatives). It is difficult to test the validity of the models for pricing options and other derivatives (their 'truth') empirically because one judges the validity of the formulas and the efficiency of markets at the same time. If the formula does not work, this may be due to the inadequacy of the formula, the inefficiency of markets, or both. The same is true if the formula works.
4 According to Shackle (1972, p. 163), the problem of economics is that it still attributes a dual task to itself: to describe how things are and to show how they can be controlled. However, these two tasks are incompatible.
5 Systems theory speaks of 're-entry', a notion which was introduced by George Spencer Brown (1972) in his calculus of forms.
6 Swan (2000, p. 17) defines derivative as 'sales of a promise'.
7 The difficulty in accepting the reality of virtual entities (the reality of risk) is displayed by the centuries-old debate on the validity of contracts where no good is transferred, because the seller neither owns the good nor will he own it in the future. At the very least, intent to exchange the goods was required, i.e. a present engagement towards the uncertainty of the future – but this obviously did not work, and the 'intent test' was abandoned definitively in the 1980s: see Swan (2000, pp. 205ff.).
8 Shackle speaks of a 'general pre-reconciliation' (1988, pp. 9ff.) of choices by all actors in the (perfect) market.

9 The inevitable reference is Knight (1921), who distinguishes radical uncertainty from risk, i.e. from the lack of knowledge that can be controlled with the calculus of probability and information. Under the sociological label of the 'risk society' (Beck, 1986; Luhmann, 1991), the terminology is reversed (often causing confusion). Risk is the possibility of future damages that derive from the very conduct of the operators. This risk is radical and persistent, because the future remains open and things can always go wrong as a result also of what we did or did not do. As we shall see later, radical uncertainty always includes a moment of reflexivity. I cannot know how things will go because they also depend on what I do or do not do.

10 Strictly speaking, it makes no sense to speak of imperfect information, since perfection does not exist.

11 MacKenzie (2006, p. 184) observes that, during the crisis, purchases and sales are no longer informationless and actually affect prices – according to 'information economics' this always happens, though it is not always so evident.

12 At the origin there is Keynes' famous 'beauty contest' (1973 [1936], ch. 12).

13 From an interview with Warren Buffett: 'my purchases are dictated by a simple rule: be cautious when the others are greedy, greedy when the others are cautious' (*la Repubblica*, 18 October 2008).

14 In this radicalized version, the notion of performativity overlaps with the controversial concept of autopoiesis from social systems theory (Luhmann, 1997, pp. 65ff.; Maturana & Varela, 1988). Autopoiesis indicates the condition in which the elements constituting a system are generated out of the network of these same elements: communications are generated by previous communications and are never imported directly from the environment. As the term (from the Greek 'poiesis', i.e. production) says, the system 'produces' itself and its reference to the environment. The environment can irritate or stimulate a system, but cannot intervene directly. This does not mean that the environment does not count, but that it is acknowledged by the system only in the manner and according to the forms that it is able to detect: as 'hetero-reference', i.e. as a reference (within the system) to what is outside it. Irritations and uncertainties are related to the operations of the system: they are a 'self-generated indeterminacy' that must be managed by the structures of the system (Luhmann, 1997, p. 67). The term 'autology' (mentioned in the first section of this paper) expresses the consequences of this condition: 'the description realizes what it describes. It must then co-describe itself while realizing its description. It must understand its object as an object that describes itself' (Luhmann, 1997, p. 16). In the discussion that follows, however, I prefer to retain the term 'performativity' – both in order to highlight the connections with a specific and challenging tendency of economic sociology and also to avoid overloading the discussion with the complex assumptions of social systems theory.

15 Callon writes that '[a]ny concrete economy is reflexive', but then attributes to economics the 'social organization of reflexivity' (2005, p. 8), and, to the growing involvement of economics, the spectacular increase in the capacity for reflection, representation and action.

16 There has been a widespread scepticism towards a general theory of society for some time (Esposito, 2012). Pierre Bourdieu, for example, explicitly denies the possibility of such a theory (Bourdieu *et al*., 1968); actor-network theory intentionally retreats to interactions, and deals only with 'situated' relations among the members of a community (and the objects or quasi-objects involved), rejecting any reference to a wider theoretical dimension (Latour, 1987). This trend is understandable, especially given the reflexivity of the theory and the contingency of its objects. However, it comes at a cost: taking society as a reference it is possible to study the structural factors underlying these kinds of orientations – for example, the reasons why modern society must abandon the assumption of a necessary order and refer instead to contingency, i.e. to local and changing orders, which could be different and can change with time (Luhmann, 1992). The reference to society also allows for comparisons, for showing

that similar mechanisms are at work in different fields of society – performativity in economics recalls the reference to public opinion in the political sphere, to the 'news-making' of mass media, to positive law, to formulas like 'learning to learn' in education, to the very use of 'performances' in art, and many others. One can then obtain stimuli and observe the differences. Referring to society as a whole, however, does not mean assuming a superior level or a higher logic: society itself is a system that changes with its operations and fails to guarantee any rationality.

17 This is the point at which the approach we are proposing differs from other theories which recognize and study performative phenomena – such as the latest versions of rational choice theory, which also take account of indeterminacy (i.e. of the cases where information is essentially incomplete because it concerns future states that depend on present decisions) (Elster, 2007, §11.7). The proposed solutions use a Bayesian model (Gintis, 2009, pp. 18ff.), according to which probabilities change over time as new information is acquired. In this way, however, one fails to consider the most important and problematic aspect of performative processes: over the course of time one not only knows more, but experience often leads to change in the very criteria by which one evaluates information, even that which was already considered. This changes the decision-making situation as a whole, in a radically unpredictable manner that does not preserve the 'preference consistency' on which these approaches are based (Esposito, 2007, pp. 57ff.).

18 Decisions are made under conditions of 'bounded uncertainty', facing an unknown but structured future, which we know to be bound by our choices: an open but non-random future (Shackle, 1990, pp. 13, 22, 28–48).

19 Mandelbrot was referring to the collapse of the financial market in October 1987, but the reasoning applies *a fortiori* to the recent crisis.

20 Economics talks of 'wild randomness' as a totally uncontrollable randomness. But this means that there should be a more 'educated' randomness, which behaves in a predictable way – a curious not random randomness, which reveals the blind spot of the model.

21 Mandelbrot (Mandelbrot and Hudson, 2004, ch. 9) speaks of dependency and pseudo-cycles.

22 And also shows very different consequences of performativity in different nations or sectors: the crisis, as we know, did not have the same scope or the same effects everywhere. There were cases in which other (often non-economic) factors have constrained or contrasted the circularity of the markets. To operate with these factors is typically the task of politics, which cannot determine or directly govern market trends, but can intervene with more or less effective actions of 'disturbance'. The markets then react according to their forms, becoming once again open and unpredictable (because they often performatively anticipate political intervention: think of the great debate about banks being 'too big to fail', which relied on this condition). One cannot therefore guarantee the success of an economic policy, but this unpredictability can (and should) be considered in political action in order to plan a more complex and reflexive action for 'steering' (Esposito, 2011, pp. 188ff.).

23 Mandelbrot (Mandelbrot and Hudson, 2004, p. 239) describes the dependencies that arise in the absence of correlations and require models for studying risk based on more sophisticated techniques (in his case the mathematics of fractals). We could talk of a different relationship with information, where the information produced by data is different from the information contained in data.

24 This is the project of sociological systems theory, which departs from autology in order to reconstruct the structures of a society that contains its description inside itself (see Luhmann, 1997).

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