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Giorgio Lunghini

Bruno de Finetti and Economic Theory

That which is logical is exact, but tells us nothing.
B. de Finetti

Wooziness that knows it is woozy may tell truths
Logic is deaf to.
W.H. Auden

Bruno de Finetti has made many important contributions to the social sciences, especially to economic theory: to economic theory and on economic theory. His main contribution to economic theory, which has never been sufficiently developed or valued by economists, is that to which he owes his fame as a great mathematician: his concept of probability. On the other hand, his essays "bearing more or less direct relation to problems of an economic nature", had a remarkable impact on economists of my generation. There are at least fifty essays and they bear witness to an unwavering attention to the analytical aspects of economic theory and to the epistemological and political problems it poses. [1].

Remembering de Finetti, with both nostalgia and gratitude, I would like to recall the Centro Internazionale Matematico Estivo, an international summer conference on mathematics which, rather than sending young academics abroad, brought the great minds to Italy where they gave memorable lectures. An International mathematical summer centre whose purpose

has always been the same, ever since the first course on Mathematical Economics held in Aquila in 1965: to see if, and if so which, mathematical contributions could succeed in bringing about improvement in the field of economics with regard to structures, criteria and situations increasing the quality of life amongst populations. [2]

[1] B. de Finetti, *Un matematico e l'economia*, S. Lombardini ed., Franco Angeli Editore, Milano 1969. De Finetti's writings are often difficult to trace. In this volume one can find de Finetti's writings cited in this paper marked with *; those marked with ** can be found in B. de Finetti, *La logica dell'incerto*, M. Mondadori ed., Il Saggiatore, Milano 1989.

[2] B. de Finetti (ed.), *Dall'utopia all'alternativa (1971-1976)*, Franco Angeli Editore, Milano 1976; and *L'utopia come presupposto necessario per ogni impostazione significativa della scienza economica*, in B. de Finetti (ed.), "Requisiti per un sistema economico accettabile in relazione alle esigenze della collettività", Franco Angeli Editore, Milano 1973.

1. De Finetti's fundamental contribution to economic theory is, as I said, his concept of probability. The concept of probability which is also the concept at the basis of J. M. Keynes' theoretical construction, is however regarded with some suspicion not only by neoclassical economists, who lead in criticism of Keynes but also by many Keynesian and post Keynesian economists. Economists, in general, prefer deterministic and deductive reasoning. Keynes poses the question in the following terms:

> [Under uncertainty] there is no scientific basis on which to form any calculable probability whatever. We simply do not know. Nevertheless, the necessity for action and for decision compels us as practical men to do our best to overlook this awkward fact and to behave exactly as we should if we had behind us a good Benthamite calculation of a series of prospective advantages and disadvantages, each multiplied by its appropriate probability waiting to be summed. [3]

Keynes' introduction of the concept of probability into his *General Theory* stems from this problem, not with the aim of shaping it with any probabilistic type of epistemic structure, but in order to deal with two crucial variables in the functioning – usually the malfunctioning – of a 'monetary theory of production' (i.e. capitalism): the determinants of interest rates and of investment decisions. It is to this end that Keynes develops his theory on probability, a subject on which I will not dwell, only noting the extent to which it emerges in de Finetti's criticism:

> The point of greatest conceptual importance over which, my opinions and the opinions of Keynes and Jeffreys diverge lies in our response to the question: is probability subjective? Keynes and Jeffreys deny it. Keynes says: "If the facts determining our conscience are assigned, that which is probable or improbable, under these circumstances, remains fixed, independently to our opinion"; similarly the concept is reiterated several times, and also found in the following quotation by Bradley: "probability tells us what to take as the truth on the basis of certain data; it is not relative or subjective to a greater degree than any other hypothetical conclusion, it is relative in relation to the data it deals with, but beyond that, in no other sense". [...] Now, by saying that probability is subjective I mean that its evaluation can differ according to whom is judging it, depending on mental differences between individuals, and inversely, by admitting this dependency, I can't see that probability can be declared objective. [...] A clear distinction that supports my point of view is that concerning primary and secondary propositions [...]. Primary propositions would be those affirmations containing no evaluation of probability while secondary ones do. For me, an affirmation containing an evaluation of probability is senseless without a subject (or implied subject): the agent who evaluates the probability. [4]

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[3] J. M. Keynes, *General Theory of Employment* (1937), *Collected Writings*, vol. XIV.
[4] B. de Finetti, *Probabilisti di Cambridge* **, "Supplemento Statistico ai Nuovi Problemi di Politica, Storia ed Economia", 1938.

2. The point is this: if Keynes had permeated the whole of his *General Theory* with the concept of probability, seeing it as subjective probability, in the way that Ramsey and de Finetti see it (and he could have done, thanks to Ramsey), he would have had to abandon any distinction between primary and secondary propositions, and thus the whole *General Theory* would have been open to criticism on the grounds of vagueness and irrationality (even more so than it already was and still is). It is useful to remember, on this count, that the concept of probability de Finetti proposed is not at all indeterminate or irrational. Here is an authentic and very clear illustration of this:

> What are we saying, in common terms, when stating that an event is more or less probable? We mean that we will feel surprise to a greater or lesser extent when we find out that the event has not actually happened. We mean that we feel we can rely, to some degree, on the eventuality of the happening coming about. Probability, in this sense, is still vague and obscure and made up of the degree of doubt, uncertainty, or conviction that our instinct makes us feel when thinking of a certain future event, or an event of which we don't know the outcome. Does this instinct obey any laws? Why should it? Here is a chapter of psycological logic criticism on the principles of probability theory that it is necessary to skim through: I will merely note that in order to measure probability by number and to show that this can be done according to the classic, well known, theorems you can follow at least three different methods, two inspired by the usual procedures and the third, completely original. Personally only this last method satisfies me. [...] The probability of an event is therefore relative to our degree of ignorance; although we can still consider it, in a certain sense to retain some objective value. It can be thought that an individual who knows a certain, definite set of circumstances and is unaware of any others must logically evaluate probability, at least for certain events, in a definite way. [Here de Finetti adds the note: "This seems to me to be Keynes' point of view".]. If the distinction between known and unknown circumstances is obviously relative - relative, that is, to our level of ignorance - we can still consider the distinction between circumstances that may or may not be linked to cause and effect in relation to a given event taking place, to be objective. [...] But let us first examine our consciences, and consider when we really feel that a circumstance can influence a certain fact. Is it not exactly when our knowledge of it influences our judgement of probability? [...] There is no escaping the fact, whatever we might say or think, that in the end we always finish up at the same conclusion: the concept of cause and effect is nothing but subjective and depends essentially on the concept of probability. [5]

3. The *General Theory*, being a theory intent on founding an economic policy, and thus a theory in which the relationship between the individual and government is essential, could not fail to confine the relevance of a subjective theory of probability to the micro economic level. Otherwise it could not imply the existence of some kind of cause and effect relationship, however weak, between political decisions and systemic results. A government should step down, if it is not ready to back the link

[5] B. de Finetti, *Probabilismo. Saggio critico sulla teoria delle probabilità e il valore della scienza* **, "Biblioteca di Filosofia", Libreria Editrice F. Perrella, Napoli 1931.

between an 'if' and a 'then'. In the case of Keynes this bet is particularly daring. His ideal government would in fact be able to reduce or compensate the negative effects of uncertainty (stemming from limited knowledge) suffered by agents, through intervention to change their expectations: indirect interventions to modify or direct interventions to sidestep them; in both cases, trying to make everyone certain through behaviour regulation of the agents. (I precisely remember that de Finetti was never particularly sensitive to the relationship between the macro and microeconomic levels.)

Regarding the relationship between economic theory and practical politics it pays to remember Keynes' own warning about the capacity of his *General Theory*:

> This that I offer is, therefore, a theory of why output and employment are so liable to fluctuation. It does not offer a ready-made remedy as to how to avoid these fluctuations and to maintain output at a steady optimum level. But it is, properly speaking, a Theory of Employment because it explains *why*, in any given circumstances, employment is what it is. Naturally I am interested not only in the diagnosis, but also in the cure; and many pages of my book are devoted to the latter. But I consider that my suggestions for a cure, which, avowedly, are not worked out completely, are on a different plane from the diagnosis. They are not meant to be definitive; they are subject to all sorts of special assumptions and are necessarily related to the particular conditions of the time.[6]

4. As further confirmation of de Finetti's importance as an epistemologist (if this were necessary), I recall a conference held in 1930, and compare de Finetti's ideas with the much praised writings of Ettore Majorana (circa 1933-34). Majorana summarises his own position as follows:

> The deterministic conception of nature hides a real weakness within itself in the form of an irremediable contradiction with the most certain data of our consciousness. G. Sorel tried to settle this dispute through the distinction between *artificial nature* [in which phenomena are not marked by an appreciable breakdown of energy] and *natural nature* (which is acausal) [where the phenomena, like that of common experience, are affected by passive resistances and are therefore not dominated by definite laws but depend to a greater or lesser extent on chance], but in so doing he denied the unity of science. On the other side the formal analogy between the statistical laws of physics and those of social science accredited the opinion that even human facts obeyed a rigid determinism. It is thus important that the principles of quantum mechanics have lead us to recognise (beyond a certain absence of objectivity in describing phenomena) the statistical character of the ultimate laws of elementary processes. This conclusion gives weight to the analogy drawn between physics and the social sciences, between which a common identity regarding values and methodology has resulted. [7]

The same problem had been posed, earlier, by Finetti:

> When faced with the results of modern physics [...], must we renounce the principle of causality? Must we deny determinism? [...] The conflict rests in a single point, and regards

[6] See Keynes' 1937 article.

[7] E. Majorana, *Il valore delle leggi statistiche nella fisica e nelle scienze sociali*, "Scientia", 1942 (but 1933-34).

the choice between these two positions: 1) necessary and immutable laws exist; natural phenomena are determined by their antecedents with precision and absolute certainty; 2) no real laws truly exist; forecasts cannot be certain but only more or less, or maybe immensely, verisimilar or probable: so called 'natural laws' are nothing more than the expression of a statistical regularity. [...] Refusing to accept determinism we must wholly accept the second of the two positions that I have fixed: forecasts are then no longer certain but only more or less probable. [...] The essential novelty in scientific method would be the substitution of logic with the calculation of probability; in the place of rationalistic science in which the certain is deduced from the certain there would be a probabilistic science where the probable was deduced from the probable. [...] To put it simply, it is about substituting a law, which states that: "an event will necessarily go in a certain way" with a law that instead states, "an event will probably go, more or less, like this". [8]

It is interesting that two of the great physicists or mathematicians of the 20th century pose the exact same question, and that their solutions overlap; it would be interesting to know if Majorana was aware of what de Finetti had said.

5. Economic theory, for de Finetti and many other Italian academics of his generation, is the paretian theory of general economic equilibrium. However de Finetti contests the fact that to reach the point of "economic equilibrium", at which wellbeing cannot be increased for some if not at the detriment of others, it is enough only to give free reign to private initiative and to the markets:

It is no longer possible to consider the ideal and very concept of a more humane, more civilised, more Christian social justice to be at odds with the immutable economic laws, treating it in the same way as aspirations to perpetual motion, as incompatible with the immutable laws of physics. [...] A more serious and hateful sophism is added to the error at the basis of research into the "optimum", through the adoption of certain means of approach: the *optimistic sophism* of liberalism and the superstition of *self-adjusting anarchy*, according to which, to reach maximum wellbeing for all the surest and simplest way would be to permit each individual to try and make the maximum possible selfish profit. [...] But is such an axiom true? Many pseudo demonstrations are based on pretexts similar to mechanics, where, effectively, lower potential energy configurations happen spontaneously and equilibrium is thus reached spontaneously when the energy reduces to a minimum. It is useful to demonstrate immediately why the analogy is only apparent and the conclusions illusory. [...] Living creatures and men in particular can be put to far more intelligent trial but they cannot be expected to behave according to the coherent deterministic logic of rational mechanics. This is the grotesque error of those who hope to model economics or sociology along the same lines as mechanics, and even believe in the possibility of a spontaneous equilibrium of liberal anarchy in the political and economic régime. [...] Bringing some logic to economic organization doesn't merely mean saving the system's most direct victims from hunger and

[8] B. de Finetti, *Le leggi differenziali e la rinuncia al determinismo*, "Rendiconti del Seminario Matematico della R. Università di Roma", 1931; and B. de Finetti, *La probabilità e le scienze sociali*, "L'industria", 1955.

misery; it also means putting right, for everybody's sake, the material over estimation that the current system inevitably provokes. [9]

6. De Finetti's reflection on the usefulness of mathematics to economics and on the presumed 'neutrality' of economic science stems from here, from this discussion of the paretian "optimum", a reflection that runs through and unifies his economic essays. De Finetti's suggestion (and implicit criticism of economists who do not follow his ideas, economists that he describes as "the rash individuals who use formulae and mathematical terminology with the same lack of conscience as a mathematician unable to resist the temptation of playing at being a surgeon in order to crack open their heads and reshuffle their brains in the hope of making them work better") is one of wisdom and good sense:

Regarding the use of mathematics, for my part, it is clear to see that it is limited to the necessary minimum needed to deal with and display questions in the simplest and most intuitive way possible. This always remains my supreme aspiration in every case: I distrust any explanation or demonstration (even if it has been formally proven right) until I feel that the simplest and most significant formulation and interpretation possible has been reached, to the extent that it seems obvious to anyone who reaches its essence.[10]

It is only a small step from this invitation to use caution and maintain simplicity when using mathematics to criticism of the presumed neutrality of economic science (criticism which de Finetti has in common with Federico Caffè):

The problem with the theory on "neutrality", or rather the problem with its supporters is that they distort the facts, interpreting the concept of neutrality in a completely partial way: like a ban on formulating different objectives to those that inspire the current system, and thus, in effect like some kind of gratuitous chrism to dogmatically consecrate actual reality, whatever that may be. As Ragnar Frisch shrewdly observes, in this way it can easily be shown that any regime you may wish to consider (from that of free competition to the regime in Nazi concentration camps) can be judged as 'the best', because the conditions and hypotheses introduced or implied limit the view, significantly reducing any comparison between the current system and itself. [...] Those who proclaim themselves 'neutral' may believe that they really are or might pretend to be but in general they are fooling themselves or others by including their own 'value judgements' in their definition of 'neutrality'. [11]

The apparent neutrality of mathematical economics could be said to be a consequence of the fact that mathematics *de-contextualizes* its object, removing its political

[9] B de Finetti, *Il tragico sofisma* *, "Rivista Italiana di Scienze Economiche", 1935; and B. de Finetti, *Vilfredo Pareto di fronte ai suoi critici odierni*, "Nuovi Studi", 1936. The analogies between some of Keynes' and de Finetti's writings are quite astonishing, but possibly de Finetti was not entirely aware of these similarities. See *The End of Laissez-faire* (1924), *Economic Possibilities for our Grandchildren* (1930), *Poverty in Plenty: is the Economic System Self-Adjusting?* (1934), *Collected Writings*, vol. IX and XIII.

[10] B. de Finetti, *All'attacco contro i feticci*, in *Un matematico e l'economia*. See also *La crisi dei principi e l'economia matematica*, "Acta Seminarii", 1943; and B. de Finetti, *L'apporto della matematica alla comprensione dei problemi economici*, "Metra", 1966.

[11] B. de Finetti, *Benvenuto al disgelo**, "Civiltà delle macchine", 1962.

dimension and thus decreasing its relevance. 'Relevance' is however an ambiguous term in political economy, (which I think, to quote Keynes, is "*a blend of economic theory with the art of statesmanship"*), but I am tempted to say that a relevant proposition is a theoretical result that poses a political problem (regarding economic policy). I draw on an example from Keynes: his theory regarding the normality of an unemployment equilibrium ("*an intermediate situation which is neither desperate nor satisfactory is our normal lot*") is exemplary from a theoretical point of view and poses an economic policy problem. The neoclassical proposition according to which profit maximisation requires the marginal cost and price to be equal is theoretically irreproachable and that is all there is to it. Taking a more radical approach, it could be said that a proposition is relevant if, rather than solving a problem it poses one.

7. A topic close to the use of mathematics in economics is that of econometrics. Writes de Finetti:

> The rôle of mathematics when applied in other fields of science to its own is always open to discussion: to be of any use it must work in total symbiosis, in which all the forces from both sides collaborate with complete unity of intent. Economists only wanting to use the mathematics that serves their purpose and mathematicians wanting to limit themselves to theorising on only that which seems to provide them with elegant structures would both make a terrible use of it. Ragnar Frisch, one of the initial pioneers of econometrics, interprets this second danger, expressing the opinion that too many modern works and whole theories currently in favour are devoid of any real interest for economics and far from any possible concrete application. They are exercises playing with abstruse formulations that translate fictitious or futile problems: they do not belong to econometrics but to '*Play-o-metrics*'. [...] The main question is that regarding the finality of econometric studies: cognitive or normative finality, in passively describing and laying out the facts just as they are to be observed, or instead through indicating the way to towards certain aims and the actions and measures to take in order to achieve those aims. [...] The most decisive aspect of such an alternative regards behaviour towards the extreme positions: acceptance of automatism of the market or of integral planning. [12]

The market or plan question is often present in de Finetti's writings, but it is interesting that here he returns to it while discussing the use of mathematics and econometrics. The way that these two topics tie up, (or should tie up), is as follows according to de Finetti:

> *First*: Fix development of the essential activities in a remarkably rigid way, removing any influence of will and conflicting or external interests to those collective interests represented by the state; *Second*: see to the provision of a sufficient level of flexibility through variously decentralised self-regulating mechanisms (cybernetic problem of *feedback*), *a)* in a certain environment with automatic pre-arranged rules and *b)* in another environment, entrusting this

[12] B. de Finetti, *Econometristi allo spettroscopio**, "Rivista trimestrale", 1965.

task to an opportune form of spontaneous and autonomous private initiative. Needless to say, this is a mere conjecture about things that neither myself nor anyone else of greater competence should confirm only on the basis of generic reflections; *To precisely state these facts by a reliable method would be the most arduous and the most fundamental undertaking of economic studies in general and econometric study in particular.*

Regarding "the good use of mathematics", de Finetti writes in the same essay:

The question isn't about using one type of mathematics or another, elementary or higher, ancient or modern and so on. There is nothing good or bad in itself: it all depends on what use it is put to (or in another case, *the way it is taught* [my italics]) that can be good or bad, or more precisely, suitable or not. The most typical case is an axiomatic formulation: it shows that a certain property (or the existence of an equilibrium) exists in a certain problem under certain hypotheses, or 'axioms'. Mathematically every result of this type (supposed exact) is an exact result, and no argument. *But what really matters is what it contributes to economics, and this all depends, not on whether the result is true or not but on how much it responds to something important.*

Regarding econometrics, on the other hand:

A trend could be revealed – to my mind immoderate – of presenting the results of empirical investigations as if they expressed a law (or rule, or what you will) which you can recite "sub specie aeternitatis", while it should be clear that naturally, in most cases, everything, or almost, depends on the contingent circumstances present at the time and place where the observations were carried out. This tendency seems to me to be 'right wing' due to its implicit hypothesis of the immutability of situations.

Here, naturally, Keynes' criticism of Tinbergen comes to mind:

My point against Tinbergen is a different one. In chemistry and physics and other natural sciences the object of experiment is to fill in the actual values of the various quantities and factors appearing in an equation or a formula; and the work when done is once and for all. In economics that is not the case, and to convert a model into a quantitative formula is to destroy its usefulness as an instrument of thought. Tinbergen endeavours to work out the variable quantities in a particular case, or perhaps in the average of several particular cases, and he then suggests that the quantitative formula so obtained has general validity. [...] The pseudo-analogy with the physical sciences leads directly counter to the habit of mind which is most important for an economist proper to acquire. I also want to emphasise strongly the point about economics being a moral science. I mentioned before that it deals with introspection and with values. I might have added that it deals with motives, expectations, psychological uncertainties. One has to be constantly on guard against treating the material as constant and homogeneous in the same way that the material of the other sciences, in spite of its complexity, is constant and homogeneous. It is as though the fall of the apple to the ground depended on the apple's motives, on whether it is worth while falling to the ground, and whether the ground wanted the apple to fall, and on mistaken calculations on the part of the apple as to how far it was from the centre of the earth. [13]

[13] Letter by J. M. Keynes to R. Harrod, 1938, July 10, *Collected Writings*, vol. XIV.