

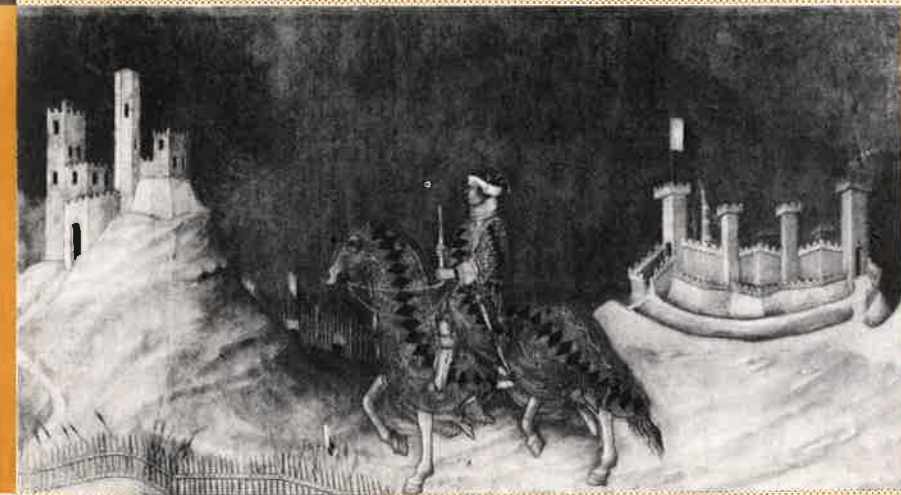
UNIVERSITA' DEGLI STUDI DI SIENA
Facoltà di Scienze Economiche e Bancarie



QUADERNI DELL'ISTITUTO DI ECONOMIA

John Hicks

RATIONAL BEHAVIOUR:
OBSERVATION OR ASSUMPTION?



QUADERNI DELL'ISTITUTO DI ECONOMIA

COMITATO SCIENTIFICO

MARCELLO DE CECCO

MASSIMO DI MATTEO

RICHARD GOODWIN

SANDRO GRONCHI

GIACOMO PATRIZI

SILVANO VICARELLI

Coordinatore

SANDRO GRONCHI

Alla presente Collana "gialla" di quaderni l'Istituto di Economia affianca una Collana "celeste" di monografie. I numeri pubblicati a tutt'oggi sono i seguenti:

- 1) GIUSEPPE DELLA TORRE, Istituzioni Creditizie ed Accumulazione del Capitale in Italia (1948-81), 1984.
- 2) SANDRO GRONCHI, Tasso Interno di Rendimento e Valutazione dei Progetti: una Analisi Teorica, 1984.
- 3) ALDINO MONTI, La Proprietà Immobiliare a Bologna in Età Napoleonica (1797-1810), 1984.
- 4) GIULIO CIFARELLI, Equilibrium and Disequilibrium Interpretations of Inflation, 1985.

• Redazione: Istituto di Economia della Facoltà di Scienze Economiche e Bancarie - Piazza S. Francesco, 17 - 53100 Siena - tel. 0577/49059

• La Redazione ottempera agli obblighi previsti dall'Art. 1 del D.L.L. 31.8.45 n. 660

• Le richieste di copie della presente pubblicazione dovranno essere indirizzate alla Redazione

• I Quaderni dell'Istituto di Economia dell'Università di Siena vengono pubblicati dal 1979 come servizio atto a favorire la tempestiva divulgazione di ricerche scientifiche originali, siano esse in forma provvisoria o definitiva. I Quaderni vengono regolarmente inviati a tutti gli istituti e dipartimenti italiani, a carattere economico, nonché a numerosi docenti e ricercatori universitari. Vengono altresì inviati ad enti e personalità italiane ed estere. L'accesso ai Quaderni è approvato dal Comitato Scientifico, sentito il parere di un referee.

John Hicks

RATIONAL BEHAVIOUR: OBSERVATION OR ASSUMPTION?



Siena, marzo 1986

Sir John Hicks Nobel Laureate is professor emeritus at Oxford University and a fellow of All Souls College. Over the past fifteen years he has given seminars and lectures at the Istituto di Economia of the University of Siena.

The obvious interpretation of the statement that an action is rational is that the agent can give reasons for it - that he can explain why he does it, or did it. The clearest instances are those where he has actually set out his reasons, when he has had to make a case for doing this, not that. Consider a Chairman (or President) reporting to his Board of Directors, or a Finance Minister (on the British system) presenting his budget. There can then be no question but that the decision is rational.

One may nevertheless have suspicions that the reasons presented are not the true reasons - that the Finance Minister, for instance, has been influenced by pressures from interested parties, more than by the reasons which he gives. But I do not think that we should want to say that a decision, which has been influenced in this way, is any the less rational. The reasons are different, perhaps less respectable; still they are reasons.

This distinction, between the reasons which are stated by the agent and those which are suspected by the investigator (historian or economist) is nevertheless of quite central importance. Much of what follows will turn upon it. It may be brought out by noticing, still taking the political example, that there may be public reasons for a political decision, set out in speeches or published statements, and that is all that for a time (perhaps a long time) the historian has available to him. But then the time comes when private papers are released, which provide additional evidence on what was intended. Even then, however, the historian may still have doubts on whether what has become available shows what was "really" intended. He may have other information, which "must have been" known to the agent, and he cannot believe that it was not taken into account, though it does not appear in the papers before him.

I find it useful to begin with this historical (or historiographical) problem, though it may seem at first sight to be far away from economics. But perhaps it is not so far away as may at first sight appear. For consider the case of Banking histories. Bankers, in most countries, are every chary of giving reasons for their actions; they do not give them at the time when they are made, and even when, as sometimes

happens, their private papers become ultimately available, they are usually found to be very unrevealing.⁽¹⁾ So the main source of direct evidence on motive, to take the British case as an example, is to be found in statements made by bankers to later commissions of enquiry; but these of course are tainted by the witness's knowledge, by the time of the enquiry, of what was to happen afterwards. So the historian of banking is bound to rely, in large measure, on his own reconstruction; on what he can suppose, from his own knowledge of the facts, and from what he can fairly suppose must have been known to the agent, what the motives must have been.⁽²⁾

I have deliberately begun with this banking example, though to the economist it is a special case. The decisions of bankers, especially central bankers, have (or may have) what we may call a "macro" quality; the consequences which follow from them can radiate far and wide. Why such a decision was made would be a proper subject for historical enquiry. But the decisions with which, in economics, we are mostly concerned are not like that.

We are mostly not concerned with particular decisions, but with classes of decisions. Even if we have information about the particular dealings of particular traders (as we might have, on occasion, if it came out in legal proceedings) we would not use it. The combined effects of a number of similar decisions are our object of study.

So we proceed at once to what in the "macro" case would have been the final stage in the enquiry - reconstruction, from other evidence than direct witness, what we think that the reasons for the actions must have been. That is more practicable than might appear at first sight, just because we are concerned with classes of actions; so it is enough if we do our reconstruction for a representative case.

It is here that we are helped by using an assumption of rationality, in rather a strong sense. For it is not sufficient to assume that the agent could give a reason for his action; more than that is required. For here it is we, not the agent himself, who have to give the reason. It must be what we ourselves would think to be a good reason, at least an intelligible reason. That is quite a big assumption. I am fully prepared to admit that there are cases, which may be important cases, for which we

would not dare to make it. Did the German people have a good reason for voting for Hitler in 1932?

If, in economics, we so often dare to make it, that must be because of something special about economic behaviour. We are considering classes of decisions, so it is to the general characteristic of those decisions, and of the people who make them, that we must look.⁽³⁾

The simplest class, of the people whose decisions can be analysed in this manner, is the class of merchants. I define a merchant as one who buys in order to sell again.⁽⁴⁾ Whether what he buys is physically the same as what he sells is not important; thus an artificer, who is working for a market, I also reckon to be a merchant.

The simplest kind of mercantile dealings is that in which each transaction (consisting of purchase and sale) is separate. It is undertaken for its own sake, without reference to the possibility that the terms on which it is made may influence the terms on which it will be possible to make further transactions. (A sufficient condition for this test to be satisfied is that the parties to a particular bargain are unlikely to meet one another again. That can be judged without asking them questions).⁽⁵⁾

There can here be no question of the rationality of the proceeding. The merchant is in business to make a profit. We do not have to assume a profit motive. It is inherent in the nature of the business that is being done.

I find it useful to regard this mercantile behaviour as the purest type of economic behaviour. The merchant - the pure merchant, who confines himself to such market-oriented dealings - is the original Economic Man. His behaviour is so rational, so clearly rational, that we (economists) can readily reason from it; our reasoning from it is the start of Economics.

It may be objected that in the work of what we reckon to be the first great school of economists, the Classical economics of Smith and Ricardo, the merchant does not so obviously occupy a leading place. There was an economics of production, not of trading. The farmer and the manufacturer are the people we meet in their pages, not the trader. I believe however that the picture looks different if one goes

further back.

It was many centuries earlier, in fifteenth century Florence, that merchants began to study how to keep accounts. They did so long before they were followed by anyone else. The merchant, looking for profit, found that he had to keep his books, in order to see how much profit he was making, how successful he was being in making a profit. The appearance of the practice of keeping accounts, which first appears among merchants, is a clear indication that the business is being conducted rationally, with an eye to profit. We do not need to make an *assumption* about profit motive with that evidence before us.

During the centuries which elapsed between the invention of accounting and the time of Adam Smith, the practice of book-keeping must have spread quite widely. One need not suppose that it was general practice outside the mercantile sector; but the notions which it bred must have been becoming familiar, so that they were available to Smith and his contemporaries. Thus it was natural to assume that non-merchants, or many of them, would be behaving more or less like merchants. Though it was a simplification to treat them as Economic Men, they would be moving in that direction. That was all the Classical Economics needed, for their use of the profit motive. They were mostly concerned with what we should now call rather long-run equilibria, representative of the general state of the economy as it would be established, on the whole, over rather long periods. All that they needed for that purpose was a rule that when an opportunity presented itself, and continued to present itself, then sooner or later it would be taken.⁽⁶⁾

Afterwards, in several ways, things have become more complicated. I shall not here discuss what happened to the accounting concepts, such as capital and income, when they are applied to more complex situations.⁽⁷⁾

There is one which begins to need attention before we leave the mercantile sector. Accounts relate to the past, the decisions of business relate to the future, a future which is always to some extent uncertain and may be very uncertain. It is not sufficient, when judging a project, to judge that it is likely to be profitable; there is

also the possibility that for one reason or another it will be a failure. There will be cautious persons who give great weight to the possibility of failure; there will be others, more speculatively inclined, who will give less. We often find the cautious person saying that the speculator is irrational; if the latter is simply relying on a "hunch", the observer may agree. But the risk-taker who calculates is not acting irrationally. Especially if he calculates that he is able to stand the loss in the case of disaster, there can be doubt about it.⁽⁸⁾

The commonest way of making sure that loss will be bearable is to induce other people to share in the venture, thus spreading the risks. In order to do so, he must state his reasons; he must issue what is in fact, if not in form, a prospectus. So what was said about the first form of rational action that we considered will apply. (It is by no means denied that the prospectus may be misleading).

But as soon as we come to collaboration, even in the simple form of the partnership, other issues arise. Even if there is no more than a single decision that has to be made, it needs to be negotiated. It is only too possible that a negotiated decision may be a "second best" from the point of view of each of the parties to the negotiation; from the point of view of the observer, it is a "bad compromise". One does not need to go far to find examples.

I pass on to the (probably more important) case when there is not a single decision to be made, but when the association is to continue. There will then follow, from each major decision, a number of consequential decisions; and there must often be no time, or opportunity, for each of these consequential decisions to be negotiated. The power to take the consequential decisions must then be delegated.

That is a common situation in modern industry; but it is useful to remark that it came up, in a very strong form, in earlier times. It was then particularly insistent because of bad communications. A trading voyage might then be financed by a consortium, or partnership; but in the course of the voyage, which might well take three years, before the ship returned to Europe from India or Indonesia, the captain of the ship, who was an employee of the owners, had to be left to take the decisions

for himself. Such separation has now been much reduced by the aeroplane and the telephone; nevertheless in a modern business, especially a large business, some of it still persists. In the organization of such a business we still find a system of delegation. There is a "chain of command".

The sub-manager, who has no more than a delegated authority, cannot be left to seize any opportunity of profit that presents itself to him; for if each of them did so, they would get in each other's way. So their authority must be limited by rules, formal or informal, which prescribe the limits within which they are to act. It could be that they were left to seize any opportunity for profit within those limits; but to devise such rules as will preserve order, and will yet leave a wide opportunity for initiative to the lower ranks in the hierarchy, cannot be an easy matter. Rules, by their nature, tend to have a negative bias; it is easier to prescribe what should not be done than to prescribe what should. So the "satisficing", which some have maintained to be a leading characteristic of modern industry, would seem, from this point of view, to have its origin in delegation. The sub-manager has a task that has been set him; he has a strong incentive to reach his target, but not much to do better.

One can see that applying to the lower ranks; but it should not apply, in the same way, to the "top". But what is the top? In a small concern, where owner and general manager are one and the same, there is no problem of identification; but in a larger concern, especially if it is financed by equity capital, there is. There are two characteristics of the share that are relevant, limited liability and transferability at will (they do not need to go together). It is when both are present, so that the investor can, rationally, spread his risks by diversifying his portfolio, that the separation between control and ownership is so nearly complete.

The shareholders, legally, are part-owners of the business; legally, they have power to elect directors; but it is notorious that this is a power which it is hard to exercise. Thus it can readily happen that policy is directed, not in the first place to the pursuit of profit, which is to the interest of the shareholders, but to the maintenance of the organisation, the undisturbed existence of the business itself. When

this approach is dominant, it tends to defensiveness, the same defensiveness which in the lower ranks derives from delegation.

It is true that against this the market has provided a check. If a firm's policy is such that an outsider can feel fairly sure that it is not doing its best for its shareholders, it may be worth his while to offer high prices for blocks of shares, seeking to acquire enough voting power to change the management, either in person or in policy. Having brought about his revolution, the shares can again be sold; if the prospects of the business, as assessed by the market, then seem to be sufficiently improved, they can be sold at a profit. This sanction, however, is itself dependent on the fact that the share is a liquid asset, so that its value, at any time, is largely dependent on what it is expected to be in the quite near future. A prevalence of take-overs is not a sign that the profit motive is working smoothly. It is not in the interest of efficiency that control should be tossed about, in the pursuit of short-term gains.⁽⁹⁾

So the take-over sanction works most efficiently if it is an ever-present threat, but does not actually occur. In such a world the controllers of business, even of incorporated business, would have no incentive but to work for profit; so the assumption of profit-making rationality would perfectly fit. In practice, it is likely to be less than a perfect fit; it will be tempered by defensiveness. As long as the tempering does not go far, it may be a fair approximation to assume that the representative business man is an Economic Man. Whether or not that is so in a concrete case should be verifiable.

I turn, in conclusion, to other sectors, to Labour and to the Consumer. I do not think that in the case of Labour there is much to be added. We can recognise in the behaviour of labour, in a free labour market, the same motives, pursuit of gain and defensiveness, which we have been considering. Defensiveness must here be relatively more important, especially when the worker has few reserves to fall back on when things go wrong. It is indeed doubtful whether even in the strongest cases it is wise to treat the labour market as perfectly fluid.

The case of the Consumer, which our textbooks treat as the most elementary, seems, from the point of view which I have been sketching out, to be less straightforward. It is notable that the Classical Economists did not treat the Consumer as an Economic Man; they had no need to do so. That comes in with Jevons, with Marginal Utility. The producer was making money, so his goal could be set in monetary terms. The consumer is spending money, so his goal must be defined in a different manner. "Utility" had to be invented, in order to give him something in which to do his maximising.

To treat consumption, or spending, as a maximisation against constraints is so appealing, mathematically, that it was bound to carry all before it. But is it any more than a convenient assumption? There can be no question of the services it has performed in fitting statistics into a pattern; but that is just convenience - it does not show that people do act in the way the theory describes.

It has often been remarked that the theory implies that consumers have knowledge of the alternatives before them; but that is a condition which would be better expressed by saying that over a certain field (which is identifiable by the observer) knowledge of the alternatives that are open is easy to get. What should be the test of easiness? The (Paretian) maximisation theory is here of little help; it is an issue which is more intelligibly treated by the Marshallian method, of comparing the "utility" of the expected gain with the "disutility" of the cost. So if the gain which is got from a better bargain is highly valued by the buyer, and the trouble which has to be taken to find it is not highly valued, we should expect to find that consumer expenditure would be highly rational; the Paretian scheme would apply very perfectly. These conditions would be satisfied if the shoppers had modest incomes, so that the marginal utility of money to them was high; and if their opportunities for other employment were limited, so that they had time on their hands. I think that such conditions, when they arise, are recognisable.⁽¹⁰⁾

One should probably add that the shopping needs to be regular, as in the spending of house-keeping money on food and so on, once a week. That gives the shopper re-

peated experience, from which he learns his "work". It would not appear that irregular purchases can fit so well into the Paretian pattern. Even the consumer whose means are modest, when he has to buy a new coat, does not re-think the whole of his budget in order to see whether the purchase is advantageous. He proceeds in a much more Marshallian manner, considering what he can afford. That is a matter of the marginal utility of money to him, which is derived from his general past experience. When prices, and income, are fairly steady, it is a good guide; but in times of inflation, or great disturbance of relative prices, it can be misleading. One of the costs of inflation is that it causes choices, including consumer choices, to become less rational.⁽¹¹⁾

Notes

(1) An outstanding exception is the correspondence between bankers, that was so brilliantly utilised by David Landes (*Bankers and Pashas*, 1958).

(2) Americans, of course, since the formation of the Federal Reserve, are much better placed. The analysis of policy, from documents, which is such an ornament of Milton Friedman's *Monetary History of the United States* would hardly be possible in any other country.

(3) One can evade this issue by defining economic behaviour as being such that it is susceptible of being analysed in that manner. I gave some countenance to that approach in my *Causality in Economics* (1979, p. 44), but I have come to feel that it is not good enough.

(4) I shall now be drawing quite heavily on my *Theory of Economic History* (1969) in which the merchant, as thus defined, is a central figure.

(5) Compare the casual labour market, as discussed in my *Theory of Wages* (1932, pp. 62-69).

(6) This is further discussed in the passage in my *Causality*, that was quoted above.

(7) Many of the papers in the first volume of my *Collected Essays* (1981) are relevant. So is the well-known chapter XIV, on income, in *Value and Capital* (1939); and so is the less well-known chapter XII of *Capital and Time* (1973). Then, on the relations between the economic and the accounting concepts, there is "Capital controversies: ancient and modern" in *Economic Perspectives* (1977) and two papers (13 e 14) in the third volume of *Collected Essays* (1983).

(8) I have myself become increasingly convinced that the right way to model behaviour, when the outcome of a decision is uncertain is not by mean and variance, as is common practice in portfolio theory, but by concentrating attention on two alternatives: (1) the outcome which is judged to be the most likely, (2) the worst that is judged to have a finite possibility. These must be considered, and the estimation of them is manageable; it is hard to see that the estimation of other alternatives will often be worth the bother. (My thinking in this direction took its origin from a paper "The Disaster Point in Risk Theory" which appeared in *Economic Perspectives* (1977) and was republished, in a somewhat improved form, in pp. 251-6 of the second volume of my *Collected Essays* (1982).

(9) I have enlarged on this in my paper on "Limited Liability" (*Collected Essays* III, 13).

(10) I can illustrate by a personal recollection. Just after the time when I had finished *Value and Capital* (the first three chapters of which contain a statement of Paretian theory) my wife and I moved house from Cambridge to the neighbourhood of Manchester, where I was to teach for several years. We then found ourselves having to do our weekly shopping in what proclaimed itself to be a "purely working-class town", where most of the shoppers were housewives, who had time on their hands, since there were no extensive opportunities for part-time employment. So they went about from shop to shop, comparing prices and talking to the shopkeepers. It was a much more "perfect" consumer market than that to which we had been used in Cambridge.

(11) See my paper on "Time in Economics" (reprinted in *Collected Essays* II, pp. 285-6).

Elenco dei Quaderni pubblicati

n. 1 (febbraio 1979)

MASSIMO DI MATTEO

Alcune considerazioni sui concetti di lavoro produttivo e improduttivo in Marx.

n. 2 (marzo 1979)

MARIA L. RUIZ

Mercati oligopolistici e scambi internazionali di manufatti. Alcune ipotesi e un'applicazione all'Italia

n. 3 (maggio 1979)

DOMENICO MARIO NUTI

Le contraddizioni delle economie socialiste: una interpretazione marxista

n. 4 (giugno 1979)

ALESSANDRO VERCELLI

Equilibrio e dinamica del sistema economico-semantic dei linguaggi formalizzati e modello keynesiano

n. 5 (settembre 1979)

A. RONCAGLIA - M. TONVERONACHI

Monetaristi e neokeynesiani: due scuole o una?

n. 6 (dicembre 1979)

NERI SALVADORI

Mutamento dei metodi di produzione e produzione congiunta

n. 7 (gennaio 1980)

GIUSEPPE DELLA TORRE

La struttura del sistema finanziario italiano: considerazioni in margine ad un'indagine sull'evoluzione quantitativa nel dopoguerra (1948-1978)

n. 8 (gennaio 1980)

AGOSTINO D'ERCOLE

Ruolo della moneta ed impostazione antiquantitativa in Marx: una nota

n. 9 (novembre 1980)

GIULIO CIFARELLI

The natural rate of unemployment with rational expectations hypothesis. Some problems of estimation

n. 10 (dicembre 1980)

SILVANO VICARELLI

Note su ammortamenti, rimpiazzi e tasso di crescita

n. 10 bis (aprile 1981)

LIONELLO F. PUNZO

Does the standard system exist?

n. 11 (marzo 1982)

SANDRO GRONCHI

A meaningful sufficient condition for the uniqueness of the internal rate of return

n. 12 (giugno 1982)

FABIO PETRI

Some implications of money creation in a growing economy

n. 13 (settembre 1982)

RUGGERO PALADINI

Da Cournot all'oligopolio: aspetti dei processi concorrenziali

n. 14 (ottobre 1982)

SANDRO GRONCHI

A Generalized internal rate of return depending on the cost of capital

n. 15 (novembre 1982)

FABIO PETRI

The Patinkin controversy revisited

n. 16 (dicembre 1982)

MARINELLA TERRASI BALESTRIERI

La dinamica della localizzazione industriale: aspetti teorici e analisi empirica

n. 17 (gennaio 1983)

FABIO PETRI

The connection between Say's law and the theory of the rate of interest in Ricardo

n. 18 (gennaio 1983)

GIULIO CIFARELLI

Inflation and output in Italy: a rational expectations interpretation

n. 19 (gennaio 1983)

MASSIMO DI MATTEO

Monetary conditions in a classical growth cycle

n. 20 (marzo 1983)

MASSIMO DI MATTEO - MARIA L. RUIZ

Effetti dell'interdipendenza tra paesi produttori di petrolio e paesi industrializzati: un'analisi macrodinamica

n. 21 (marzo 1983)

ANTONIO CRISTOFARO

La base imponibile dell'IRPEF: un'analisi empirica (marzo 1983)

n. 22 (gennaio 1984)

FLAVIO CASPRINI

L'efficienza del mercato dei cambi. Analisi teorica e verifica empirica

n. 23 (febbraio 1984)

PIETRO PUCCINELLI

Imprese e mercato nelle economie socialiste: due approcci alternativi

n. 24 (febbraio 1984)

BRUNO MICONI

Potere prezzi e distribuzione in economie mercantili caratterizzate da diverse relazioni sociali

n. 25 (aprile 1984)

SANDRO GRONCHI

On investment criteria based on the internal rate of return

n. 26 (maggio 1984)

SANDRO GRONCHI

On Karmel's criterion for optimal truncation

n. 27 (giugno 1984)

SANDRO GRONCHI

On truncation "theorems"

n. 28 (ottobre 1984)

LIONELLO F. PUNZO

La matematica di Sraffa

n. 29 (dicembre 1984)

ANTONELLA STIRATI

Women's work in economic development process

n. 30 (gennaio 1985)

GIULIO CIFARELLI

The natural rate of unemployment and rational expectation hypotheses: some empirical tests.

n. 31 (gennaio 1985)

SIMONETTA BOTARELLI

Alcuni aspetti della concentrazione dei redditi nel Comune di Siena

n. 32 (febbraio 1985)

FOSCO GIOVANNONI

Alcune considerazioni metodologiche sulla riforma di un sistema tributario

n. 33 (febbraio 1985)

SIMONETTA BOTARELLI

Ineguaglianza dei redditi personali a livello comunale

n. 34 (marzo 1985)

IAN STEEDMAN

Produced inputs and tax incidence theory

n. 35 (aprile 1985)

RICHARD GOODWIN

Prelude to a reconstruction of economic theory. A critique of Sraffa

n. 36 (aprile 1985)

MICHIO MORISHIMA

Classical, neoclassical and keynesian in the Leontief world

n. 37 (aprile 1985)

SECONDO TARDITI

Analisi delle politiche settoriali: prezzi e redditi nel settore agroalimentare

n. 38 (maggio 1985)

PIETRO BOD

Sui punti fissi di applicazioni isotoniche.

n. 39 (giugno 1985)

STEFANO VANNUCCI

Schemi di gioco simmetrici e stabili e teoremi di possibilità per scelte collettive.

n. 40 (luglio 1985)

RICHARD GOODWIN

The use of gradient dynamics in linear general disequilibrium theory.

n. 41 (agosto 1985)

M. MORISHIMA and T. SAWA

Expectations and the Life Span of the regime.

n. 42 (settembre 1985)

ALESSANDRO VERCELLI

Keynes, Schumpeter, Marx and the structural instability of capitalism.

n. 43 (ottobre 1985)

ALESSANDRO VERCELLI

Money and production in Schumpeter and Keynes: two dichotomies

n. 44 (novembre 1985)

MARCO LONZI

Aspetti matematici nella ricerca di condizioni di unicità per il Tasso Interno di Rendimento.

n. 45 (dicembre 1985)

NIKOLAUS K.A. LAUFER

Theoretical foundations of a new money supply hypothesis for the FRG.

n. 46 (gennaio 1986)

ENRICO ZAGHINI

Una dimostrazione alternativa dell'esistenza di equilibri in un modello di accumulazione pura

n. 47 (febbraio 1986)

ALESSANDRO VERCELLI

Structural stability and the epistemology of change: a critical appraisal