**The Bazaar of Rationality. Towards a Sociology of Concrete Forms of Reasoning**

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Abstract: Contrary to the majority of economic theories which give ex ante a defined *rationality* to the actors, this text seeks to account for *ordinary reasoning* in an inductive way, with its sequences, computations, associations and imperfections. Studying the financial markets is interesting for this type of research program because they are characterised not only by a high level of calculation but also by a plurality of winning strategies used by the actors. Incited to maximise the bank's profits, the dealing room operators studied here do not find a "one best way". They can choose among several possible winning strategies: *mathematical arbitrage*, *economic analysis*, *chartist analysis*, or "*feeling*". These strategies differ from one another as much by the degree of clarification and constitution in the environment of the room and the market, as by the type of knowledge, more or less academic, which each one uses, and by the forms of conjectures, calculations and associations that those strategies bring about. This choice – which may be an addition – is partly imposed by the dealing room, its history, function, the economic situation, or the product. However, knowing that financial operators are relatively autonomous at work, they can more or less escape from those constraints and try to occupy positions where they will be able to use the strategy of their heart. One can thus regard the set of winning strategies as a bazaar of rationality. In this bazaar, financial operators find their way not only according to their position and the associated constraints but also according to the dispositions acquired during their primary socialisation in the family and their secondary socialisation within universities or professional institutions.

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In many academic disciplines such as philosophy, sociology or economics, rationality is a debated concept and gives rise to many definitions. A common feature of its various uses in economics, rationality – whether it be parametric or strategic, perfect or limited – is a behaviour attributed to man a priori[1]. Rationality is therefore a causal category (as it enables economic models to be established with "micro-economic" foundations in particular), but rationality is itself without causes. This unilateral and uniform attribution of rationality is justified by an instrumentalist "as if" which generally does not measure the difference that is introduced along with the concrete behaviours of actors. Studying rationality from a sociological point of view involves, on the contrary, not affirming dogmatically "all is calculation" or "nothing is calculation", but trying, inductively, to give an account of the ordinary reasoning of ordinary people. For such a program, it is necessary to endeavour, insofar as is possible[2], to describe the diversity of forms of reasoning and seek to identify their possible social determination[3].

Very few working environments use calculation to the extent that dealing rooms do: calculation of equivalencies, arbitrage, exchange rates, instant

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1 This theoretical stance is part of a common and more general approach taken in social sciences, which consists in *equipping* the actors with *skills* in order to bring out *equilibria*, *agreements* or *disagreements*, indeed *worlds* with unique properties (cf. Boltanski (L.), Thévenot (L.), *De la justification. Les économies de la grandeur*, Paris, Gallimard, 1991). Although this type of approach has the merit of revealing new configurations, it should not, however, cause us to forget that on another analytical level it is not the researcher's role to attribute *skills* but rather to show how the actors "equip themselves" and to analyse the inequality and diversity of the ways in which they do so.

2 It is very difficult to take proper account of a thought sequence that is constitutive of an act of reasoning, even if it is one's own thought. Even if one takes a self-analytical approach, one's own reasoning tends to become distorted. At present, it is only possible to work with the signs of reasoning, particularly the declarations of the use of reasoning made by actors. These are formatted for spoken or written discourse and make use of the designations that are already established by the categorisation and codification used in the social world (starting with language categories).

3 As S. Bouhedja, P. Bourdieu and C. Givry have shown, when an individual house purchase goes ahead, house-buying couples only begin calculating their budget and financing options gradually, after key interactions have taken place with the different agents in the property sector, particularly the seller, who is "a kind of living incitation to rational calculus" Bouhedja (S.), Bourdieu (P.), Givry (C.), "Un contrat sous contrainte", *Actes de la Recherche en Sciences Sociales,* n°81-82, 1990.

profits, but also of efforts, investments, hits and career opportunities within the dealing room. The dealing rooms are thus a privileged place in which to study rationality sociologically (and not logically), or – more specifically, since the term "rationality", an essential attribute given to man in many disciplines, includes its own perfection – reasoning with its lucky finds, imperfections, short cuts, associations and computations. Moreover, the financial markets are characterised not only by their high level of economic and mathematical calculation, but also by their plurality of winning strategies. Incited to maximise the bank's profits, the financial operators (traders and sales people) do not have a "one best way" but must instead choose one of the winning strategies (or use them concurrently, which is a form of choice). This choice – which may be an addition – is partly imposed by the dealing room, its history, function, the economic situation, or the product. However, as these people are relatively autonomous at work, they can partly avoid those constraints or seek to occupy positions in which they will be able to use the strategy of their heart. One can thus regard the set of winning strategies as a true *bazaar of rationality,* within which people find their way not only according to their position and the associated constraints, but also according to their dispositions acquired during primary socialisation in the family or during secondary socialisation at university or at work. The valorisation of their winning strategy consists not only in making financial profits but also in making its symbolic value both for themselves, for peers and for those in charge of the bank, which means gambling not only its power and share of redistributed profit, but also the construction and confirmation of a professional and social identity, in short, the invention of a position, which remains precarious and illegitimate.

Within the dealing room of a large bank devoted to arbitrage of equity derivatives[4], three stabilised forms of reasoning, relatively institutionalised,

[4] The investigation by observation was done between December 1997 and April 1998 within the dealing room of a large bank we shall refer to as Universal Company (UC). Some interviews were also conducted. A questionnaire was given to members of the room, half of whom responded (94 answers).

with their own history and tradition of teaching, are proposed to the actors: a method for arbitrage[5] and brokering, *mathematical arbitrage* of options, and two methods for forecasting in order to speculate[6], *economic analysis* and *chartist analysis*. On the basis of these three forms, they develop their own form of reasoning, more or less reflexive and intuitive, which results in a financial transaction.

## 1. Discovering equivalencies: mathematical "arbitrage" and volatility management

*The outlet for scholastic dispositions*

There are all kinds of arbitrages. Some are mathematically quite simple (like arbitrage of places or currencies). However, the most profitable arbitrage in recent years is derivatives arbitrage (options, exotic options) according to the underlying securities (equities, fixed income securities)[7], a technique that is based on complex mathematical knowledge.

This form of arbitrage was made possible by the discoveries of Black and Scholes. In 1973, they found a general formula for the pricing of options[8].

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5 Arbitrage is a strategy that consists in profiting from a simultaneous difference between two pricings of a single security (in two different financial centres) or from a loss of equivalence between two securities of the same family (cash and future, share and option). If the opportunity is seized in time and the equivalence is certain, then there is a definite profit.

6 Speculation is a strategy for buying (or selling) a security based on the anticipation of a favourable trend in the share price, which would then allow securities to be resold at a higher price (or repurchased at a lower price), thereby generating a profit. Profit is thus uncertain.

7 An option is a security that gives the right (and not the obligation) to buy (or sell) a particular asset, known as an underlying, on a future date and at an agreed-upon price. For example, on 17 March 2000, a call option listed at €9.67 gave the right to buy a France Télécom share at €200 at the end of April 2000. If the France Télécom share price (worth €187 on the same day) were to exceed €200 at the end of April, the option holder would want to "exercise" his option and buy the share at a cheaper price than its listed market price (regardless of whether he wishes to keep it or sell it to profit from the share value appreciation). On the other hand, if it is worth less than €200, he would choose not to exercise it and to carry out his future transactions at the market price: he would only lose the €9.67 paid for the option in March.

8 Naturally, the option price depends on whether or not, on the expiry date, the price of

Because the solution was imperfect due to the reducing nature of the adopted assumptions, this scientific discovery triggered, even within banks themselves, a dynamic of research that sought to improve the formulas of arbitrage and extend this type of solution to other products. Therefore, when the head of the dealing room decided to follow a policy of arbitrage on a given product, the activity was implemented in the following stages: importation and improvement of a pricing formula; adaptation of the formula to the design and legal features of the product; computerisation of the formula; research of the first customers; initiation of the first transactions; routinisation of transactions thanks to the daily reading of parameters permanently displayed on-screen. These various stages in the activity of arbitrage correspond increasingly to the division of labour within the dealing room: the importation, improvement and adaptation of the formulas, as well as their computerisation, is increasingly the domain of engineers, while the marketing of the products is the responsibility of the sales people. The traders only manage the securities portfolio. However, even at the time of my investigation, there were still cases where new activities were being developed and the entire chain was entrusted to the traders.

This method of organising the activity shows several possible uses of mathematics associated with several forms of excellence on the markets. The importation, improvement and adaptation of formulas are closer to academic mathematical research and require a considerable, maintained scholastic capital. On the other hand, carrying out daily transactions (a fortiori to canvass

the underlying asset is likely to exceed the exercise price established in the option contract. Black and Scholes sought a solution by developing a risk-free portfolio based on a set amount of underlying assets and options derived from that underlying. After applying complex instruments of stochastic differential calculus (to give an idea, in France today this requires the baccalaureate + 4 or 5 years of mathematical study), they deduced a formula which, although more simple, requires knowledge of a number of high-level mathematical instruments: logarithms, exponentials and, above all, normal laws (baccalaureate + 2 years of study today). The option price depends on a number of parameters: price, expiry date, current interest rate, changes in the price and trend of the underlying assets and their volatility. When an option is sold, this formula makes it possible to determine the right quantity of underlying assets the trader must have in his portfolio in order not to lose money no matter how much the price fluctuates.

customers) requires more of a basic understanding of pricing formulas. This knowledge can decrease once these other supporting elements are established, particularly the practical routine of handling the pricing indications shown on the screen. Thus for the first population, the improvement of the arbitrage formula and its replacement by a more powerful one is topical. The others, meanwhile, must know at best what type of errors the formula entails, or even simply consider pricing indicators on the screen as indicators just like any other, some of which they would follow strictly and others more generally.

Therefore, complex mathematics played a historical role and founded the legitimacy of trading positions in the dealing room at Universal Company (UC). However, with increasing computerisation depriving traders of their control over arbitrage formulas, and with greater importance given in the room to the commercialisation of derivatives and to speculation rather than arbitrage, complex mathematics has become more of a moral guarantee than a skill used on a daily basis.

Thus, only 50% of the members of the room answered that they use mathematical relations based on stochastic mathematics. For the majority of them, the use of Black-Scholes is somewhat instrumental, since 13% of the room's members state that it is a "push-button" relation and 26% say that it is a relation whose results they could at best interpret. Those with an advanced knowledge of the stochastic equivalence between financial products, in other words, those who can demonstrate or modify the Black-Scholes formula, make up only 24% of the dealing room. A regression helps us show which properties favour this kind of skill in the room (Frame 1).

Frame n°1: Knowledge of Black-Scholes. A regression model.

*Table 1. Regression modelling the probability of having or not having advanced mathematical knowledge*[9].

| Explanatory variables | | Rough ratios | *Ceteris paribus* effect | |
|---|---|---|---|---|
| **All (n=94)** | | **24%** | | |
| Position | *Engineer* | 62% | +31% | ** |
| | Others | 19% | -3% | ** |
| Diploma | ≥ Baccalaureate + 5 years | 40% | +22% | ** |
| | < Baccalaureate + 5 years or diploma unavailable | 15% | -8% | ** |
| Gender | Male | 29% | +3% | |
| | Female | 13% | -7% | |
| Experience | > 4 years in finance | 21% | +2% | |
| | ≤ 4 years in finance | 27% | -2% | |
| Father's diploma | ≥ Baccalaureate + 3 years | 20% | -7% | * |
| | < Baccalaureate + 3 years or diploma unavailable | 30% | +11% | * |
| Father's profession | "Economic" profession (CS 10 to 31 and 38) | 13% | -8% | * |
| | Other professions | 32% | +8% | * |

According to this regression, it is more the position in the division of labour (objectified by the dummy variable, being or not being a financial engineer or R&D engineer) and the diploma (objectified by the variable possession or non-possession of a diploma higher than the baccalaureate + 5 years) that determine the probability of having such capacities. This result is explained by the degree of the division of labour and by the academic nature of the knowledge used. With statistics on a small sample (94 people), it is not possible to establish very precise results. The principal effect is "absorbed" by the position held or by the diploma, both of which are also the result of social discrimination. While they are not significant at the threshold criteria normally used by econometrics (threshold criterion of 5% or 10%), the parameters do indicate the sense of relation and require further comments and possibly confirmation with a larger study. The positivity of experience in the field, although not very significant, is no doubt more a reflection of the demographic structure of the jobs than a tendency to improve one's mathematical capacities through experience (rather, the opposite is true). Women, poorly represented in both the dealing rooms and in scientific disciplines, are consequently also under-represented among those with a strong grasp of Black-Scholes. Finally, the social origin of the parents plays a rather significant role. It is measured by two variables: having or not having a father in an "economic" occupation (farmers, craftsmen,

[9] To be understood as follows: 62% of engineers in the room have advanced knowledge, compared with 24% of the general population. Using *ceteris paribus*, in other words holding the effects of other variables constant (diploma, gender, experience, father's diploma or profession), the fact of being an engineer increases the likelihood of having such a high skill level by 31% in relation to the general population. When tested, this difference is significant at the threshold criterion of 5%, shown by ** (*** marks the very significant threshold criterion of 1%, * marks that of 10% and (*) marks the less significant threshold criterion of 20%. When the test of the significance of the difference (compared with the average situation) is inconclusive – in this case, above the 20% threshold – no asterisk is shown). These *ceteris paribus* proportions and the significance tests were obtained on the basis of a logistical regression in which each method is compared to the average situation (and not a reference situation, which is the most common method used in publications, but is less practical for reading purposes).

tradesmen, heads of company, liberal professionals and administration executives in the private sector); having or not having a father educated to degree level or higher. The people whose father works in an economic profession have, *ceteris paribus*, a lower probability than others of knowing how to demonstrate or modify complex stochastic relations. Thus even in the world of equivalences between all kinds of prices and products, the conversion of one form of capital into another, of an initial economic capital into cultural capital, comes at a high price. One may note also the negative impact and relevance of a father's high-level diploma on the probability of mastering Black-Scholes formulas. This finding shows that the holders of this cultural capital are more "parvenus" than "heirs" of the school system. Indeed the fathers of members of the room with a high-level diploma (liberal professionals, managers in the private sector) often acquired this diploma more for its economic value that for its cultural value. On the other hand, parents of the mathematical virtuosos, who often work in the public service sector[10], may give relatively greater value to its cultural component that to its economic component even if they often hold a lower-level degree.

Those whose fathers belong to the dominant classes, in particular the economic sectors, are relatively speaking more numerous among sales people and heads of room. These people, although often more highly educated, do not need to know – or no longer need to know – complex mathematical relations. On the other hand, the parents of engineers are slightly more likely (even if the difference due to the sample size is minor) to be from the "cultural" sectors of the dominant classes (such as engineers and especially public office managers and professors) or from the middle or working classes. R&D engineers also have slightly lower-level and less prestigious diplomas (ENSIMAG, Télécom, ENSAE) than the most dominant members of the room, who have often studied at the Ecole Polytechnique or Ecole Centrale. Far from preventing the less highly educated engineers from entering the field of mathematics, this initial difference in mathematical ability seems, on the contrary, to favour it. Power and money are primarily of interest to the dominant individuals in the room: of the students from the Ecole Polytechnique and the Ecole Centrale, those who go in the dealing rooms are those who have the greatest economic dispositions and are most willing to give up their educational values. Once in the room, they thus readily delegate mathematical modelling to lower-level engineers. The principle of the intellectual interest of these lower-level engineers in complex mathematical

[10] 33 % of those whose mother was a high-ranking official or who hold a mid-range position in the public sector are Black-Scholes virtuosos, compared with 24% overall.

relations does not only lie in the occupational structure. In a somewhat more working-class background, it is also to be found in cultural goodwill that guarantees the educational investment enabling this type of acquisition. This educational investment is not limited to its economic aspect but, rather, affects the whole moral being and entails an adhesion to the educational order and its values, all the more so as it is the university that allowed the employees to become what they are. Thus, at UC, the orientation towards financial mathematics, in many aspects, has the same constants as the university field[11].

> Michel is an R&D engineer and graduate of ENSIMAG. His job is to develop derivatives pricing software, and he is fascinated by advanced mathematical arbitrage. On the other hand, he rejects speculation, giving the example of a trading exercise in which, after he had started off speculating in the traditional way, he "realised that he was bored to tears" and instead carried on using arbitrage on the price of call and put options. At work, he goes above and beyond his specific duties as a software developer. During a conversation, he lists historical references in the field of financial mathematics, debates the relevance of the Black-Scholes formula and stresses the importance of adopting an alternative and discrete pricing model (with a Poisson process). He appears to prove that even without carrying out the transactions of traders and sales people, he is an arbitrage professional just like them, while they often perform arbitrage without really knowing what they are doing.

While for the lower-level engineers, promoted from minor engineering schools, the assertion of their mathematical expertise and adhesion to the commercial order of the room seem somewhat compatible, the same cannot be said for those who possess greater cultural capital in its academic form.

> Marc, a former researcher in theoretical physics at the Atomic Energy Commission (CEA), is the "quant", that is, the mathematics expert in the room. After a few years spent at the CNRS, faced with a lack of opportunities to progress within the field of research and finding himself under financial pressure, he chose to move into finance. Given that his academic dispositions go against the commercial spirit of the room, he has an unhappy relationship with finance. Indeed, he does not particularly like the atmosphere in the room or his "mono-configured" colleagues who have "cut all the cables plugged into any outputs" other than money. "Modelling arbitrage relations", he explains, "is like throwing a chair out of the window and trying to model the distribution of the pieces! It can be done, it can become very complicated, but it is quite limited".
>
> What is more, he is only given trivial problems to solve, such as minor improvements and arrangements of existing models in order to price new products. First of all, in 1998, UC's head of room was not interested in developing a real team of mathematics researchers (similar to those employed in Anglo-Saxon banks). And secondly, he is not given time to implement alternative models to the Black-Scholes paradigm, still in use

[11] Cf. Pierre Bourdieu, 1984, *Homo Academicus*, Minuit.

> for modelling prices. He would like to develop alternative models where the volatility presumed constant by the Black-Scholes model would itself follow a stochastic process. However, the traders are not interested, because this type of modelling prevents them from calculating the "marked-to-market" book value (according to the daily prices), and forces them to work blind for a long period before being able to observe whether the arbitrage is winning or losing. He even says that he would like to do "proprietary trading", that is, to have his own securities portfolio in the long run. The aim of such a trading position would not be to find the right formula in order to earn money but, rather, to earn money in order to show that the arbitrage formula is right.

R&D engineers are thus in a position in which they wage out a symbolic struggle with the financial operators (traders and sales people). Even if they are responsible for most of the room's financial profit through the quality of the equivalence relations they establish and the performance of the software they develop, R&D engineers do not succeed, at UC at least, in obtaining a political and economic position that matches their contribution. It is the financial operators who harness the activity and transactions and thus succeed in making others believe that they are responsible for the profit.

In 1998, the power struggle did not favour R&D engineers. While data-processing modelling could still progress and lead to the suppression of some trading jobs, further mathematical modelling does not appear to have been so advantageous. Thus, during a meeting in which the results of the room were presented, an analyst working in modelling questioned the head of room on the advisability of hiring a second *quant*:

> "There's only one quant?"
> "The value added of a new model is falling", answered the head of room. "There are some people who believe in Graal and magic formulas!"
> "If the model's bad, we lose money!"
> "If we have a better model, we don't earn that much more than the market!"

Contrary to the opinion of some American banks, which invested heavily in developing teams of research in financial mathematics, UC, formerly at the forefront of arbitrage modelling, now considers that the marginal output of more powerful mathematical models is decreasing. This strategic orientation undoubtedly has a link with the increasingly commercial orientation of the room.

*Consequences and limits of mathematisation*

The traders who deal structured products[12], in particular the six traders working on the financial engineering desk, are familiar with the mathematical foundations of arbitrage relations. First, they are highly qualified and have chosen to work for the financial engineering desk because it has the highest positions and products in the hierarchy of technicality. Second, they must arbitrate some very complex products such as double-barrier options (the option is activated on the basis of a particular price, and deactivated on the basis of a different price) or capital guaranteed products (such as products that guarantee a 50% return on CAC 40 price increases and 0% on decreases). For that they have to make proper use of arbitrage relations. For this kind of product, the ideal is not so much to deal but to make a few major transactions on which the margin is very high. As they often deal in new products, they ask the R&D team to improve the software used for pricing or sending orders. With this team, they have to explain their needs, and sometimes take part in modelling or supervising it. Thus, the relationship between these engineers and traders is a mixture of rivalry and complicity. The *traders* tend to exploit and adapt *engineers'* mathematical and algorithmic expertise. In turn, the *engineers* acknowledge the skill of traders but nonetheless try to downplay it. It is as if these *traders* and *engineers* share the title of Excellence in arbitrage relations: the *engineers* formulate them solely as a theoretical problem, while *traders* see them as more of a practical-theoretical problem in which skill, the grain of the market and the profits generated all serve to confirm a proper grasp of the theoretical model.

While most of the traders on exotic options and structured products often have in-depth knowledge of complex mathematics, the same cannot be said for traders on more traditional options. Indeed, they work on standardised products for which modelling has already been carried out. They do not really

[12] Structured products and exotic options are contracts that include multiple optional clauses, making them more complex that standard options.

need to ask anything of the engineers or to speak the common language of mathematical modelling. Just as modelling and formulating mathematical propositions allows for an erasing of the memory of all the operations needed to establish each proposition, which allows mathematicians to focus on drawing up their next proposition, so mathematical modelling in dealing rooms currently allows the automation, computerisation and correlative overlooking of all the operations needed in order to have on-screen the optimal price of a particular option and the amount of underlying assets needing to be bought in order to provide protection.

When they have been trained in finance or at engineering school, these traders have a very rough knowledge of the main stages of mathematical modelling, or are at least able to provide the financial interpretation of the principal parameters that result from this modelling. However, it is not necessary to know this in order to be good at options trading. Moreover some traders on warrants (that is, options issued directly by private banks), often foreigners, have no degree and have a working-class background. The trader indeed has a screen in front of him, with the parameters of the formula, *delta, gamma, vega, theta* and indications for profitable purchases and sales. The job then becomes rather "push-button".

> Diane is a business school graduate with a master's degree from Paris-Dauphine University. She is a junior trader and has been carrying out equity arbitrage against arbitrage on convertible bonds. The arbitrage relation is based on the Cox-Rubinstein model, and Diane tries to give me a brief summary of the basics: "Look, it's a binomial model..." She has three screens in front of her – one to place buying and selling orders on the electronic market, an Excel screen to keep track of her position, and another screen with the in-house pricing software. As soon as a counterpart accepts one of her offers to buy or sell, she looks at her pricing software, which tells her how much protection she needs, and then positions herself on the market. She spends most of her time keeping an eye on her position on the list of the best purchases and sales. Her boss also works on the market, and now and again he calls out from his desk, "Good position, there [...]. I'm moving ahead of you." The pace is quick and the atmosphere is much more frenetic than on other desks.

On these ordinary trading desks, therefore, the mathematical side seems to be vanishing under the pressure to buy, sell and protect assets, and mathematical relations remain as mere parameters on a screen that has become

a truly automated interface.

One of the risks of mathematical rationalisation is the elimination of part of arbitrage-based trading, now performed entirely by computers. This is already the case for Ivan, whose job is to set the parameters of the computer, which deals for him.

Competing against less-educated people, beginners and middle office workers[13], trading operators will, on the one hand, boast about their mathematical abilities in order to justify their right to occupy such advantageous positions. On the other hand, faced with the growing importance of mathematical and computer modelling in trading, they try to keep a certain autonomy, for instance by giving more and more importance to speculative trading, in which profit is not guaranteed by a necessary mathematical relationship between two products. To maintain their position and independence, they take advantage of the present imperfections in mathematical modelling. This type of modelling, for instance, does not take sufficient account of developments in the volatility of securities. To arbitrate an option against an underlying security can be regarded as speculation on the development of the security's volatility[14]. Ordinary options traders thus maintain their autonomy by taking advantage of flaws in the model and can carry out a hybrid form of arbitrage that is closer to ordinary speculation.

## *2.* A rather economical economic analysis.

*A pragmatic use*

Economic analysis is not only an academic type of knowledge such as

[13] Back office and middle office managers provide administrative follow-up of the deals that are concluded instantly by traders (confirmation, settlement, delivery, compensation, recording).

[14] Some option deals between professional traders are made directly at the volatility point (inverting the option price according to the Black-Scholes formula).

mathematical arbitrage. It is also part of a general knowledge, which does not need to be learned at university. In the dealing rooms, many have never studied economics as part of their degrees but nevertheless use basic analysis on a daily basis. Thus, according to our questionnaire, 53% of the guarantors use macroeconomic reasoning. Three categories of positive responses were proposed as a way of distinguishing those who believed in the scientificity of the approach ("Yes, because it is scientific", 10%), those who adopted it for purely practical reasons ("Yes, because it works", 27%) and those who distanced themselves from this type of approach by placing themselves almost within the self-referential framework of game theory ("Yes, because everyone else does", 16%). These responses appear to show the pragmatism of those who use this form of reasoning.

Of operators, who have to develop winning strategies on the market, sales people (89%) use economic reasoning more than traders do (67%). Sales people must canvass customers (fund managers, company treasurers) and offer them derivatives managed by the traders. Therefore, they have to make a sales pitch in which economic reasoning features prominently in order to convince the customer either to try bold speculation or to protect himself from the risks incurred: "With the crisis in Asia, your portfolio is vulnerable. You need to be covered, we can guarantee your portfolio". On the other hand, the traders of a room devoted to arbitrage do not have to predict variations in prices as much, based on the economic aggregates. Nor do they need to explain their choice with clear reasoning. The other categories of personnel, who intervene very little in the market, do not have the opportunity to use economic reasoning and are not interested in this type of analysis (in particular engineers, who are often wary of macroeconomics).

*Agents and distribution tools*

With regard to stochastic calculation, some agents in the room occupy a

structural and functional position in the spread of "economic rationality". Economic reasoning was deemed important enough during the 1980s and 1990s for all dealing rooms to adopt an organisational method with an economic analysis expert (the market economist) and a time frame for the presentation of its forecasts (the morning meeting).

> Ian, the market economist of the room, explains the economic news during the morning meeting and distributes a written summary. He comments on changes in the markets on the previous day and draws his listeners' attention to the figures that are to be announced during the day (inflation, growth, salary level, defecit, etc., as well as government measures in the larger countries). For those figures, Ian reminds everyone of the "market consensus", that is, the average prediction made by the main forecasters, the UC forecast and the expected movement of the markets depending on whether the figure announced is below or above the forecast. During the day, when there is a drop in an important figure such as the unemployment rate in the United States, Ian uses a loudspeaker to inform the room of the new number, the disparity in relation to the anticipated figure and the market's initial reactions, and over the next few hours and days makes comments on how that reaction is developing.

The work of economists does not require a very high level of expertise. In this case, the economist uses neither macroeconomic models nor econometric forecasts. His work consists more in making economic articles produced by the economic services of banks more popular among operators. "The room is only interested in consensus", he says, as an excuse for not taking a greater interest in more theoretical economics.

> During a conversation, I ask Ian if he also takes account of heterodox interpretations of the different macroeconomic sequences. He replies that he also takes a personal interest in far more general matters such as the Keynesian-monetarist controversy, but that it is impossible to take an interest within the context of the dealing room because, here, the room and the market are "only interested in consensus".

As the dealing room of UC is dedicated to equity derivatives and favours arbitrage over speculation, economic reasoning is perhaps given less importance than in other dealing rooms, in particular those which favour speculation over arbitrage and brokerage or those which trade fixed income securities, on which major macroeconomic variables and the economic policy of States have a much greater impact.

The market economist, whose audience is limited, is merely one mediator

among others of economic reasoning in the dealing room. Whether or not they listen to the economist, members of the room will keep an eye on news concerning companies' progress, particularly information on mergers and acquisitions and tender offers (the rate of positive responses for these two subjects suggested in the question, "Do you use economic information with regard to the activity of listed companies?" was 70% and 69% respectively), as well as sectoral developments (49%), far more than for redundancies (29%) and appointments (23%). By reading financial newspapers on a daily basis and referring continually to Reuters and Bloomberg (62% of respondants) or reading *La Tribune* and *Les Echos* (52%), they fill their mind with information, advertisements, rumours and even ready-to-use economic reasoning.

Although less visible, their working tools also contain condensed economic reasonings. These may be assumptions for pricing algorithms or economic forecasts integrated in their databases, fuelled by a division of the work done by economic analysts. The success of the activity of buying and selling stock therefore depends largely on the correct forecasting of payouts made by companies. Although Damien, a trader on the same desk, may start his day reading *La Tribune*, he goes on to trade according to profit forecasts made by financial analysts, which are included in the database and automatically incorporated into the price calculated by the pricing software, which restricts the actual work he does in the area of economic forecasting.

Hence, through many different sources (economists, media, rumours, conversations, searches), market operators find themselves immersed in a universe where economic reasonings, which are developed, completed and orthodox to varying degrees, are available – in simple narrative forms that do not require prior theoretical knowledge – for adoption, handling, composition and appropriation.

*The mistrustful and the virtuosos*

Unequally informed, the members of the dealing room are characterised by their capacity to implement economic reasonings. Some use it as an extra that may be of use, for example, in convincing the customer, but which requires a cautious approach because of its high degree of inaccuracy. Others are true virtuosos of economic reasoning and connect consecutions of macroeconomic variables to prices with surprising speed.

> Patrick, a salesman at Loan R., has very little faith in economic reasonings, which he considers uncertain:
>
> > "Economists often make more mistakes than chartists. We went to see the economist with a customer who was very exposed to the strong Sterling. And so he said to us, "Well, the Sterling will come down in the next six months, because interest rates are too high. Therefore the government will lower the rates and the Sterling will be at around 9.30". Now, the Sterling costs 10 francs. You see, it is an enormous difference. And so, you see, he was totally wrong. You never know with economists: they always have the right explanations at the right time, but for the future... it is not so easy, and that's only to be expected" (Patrick)
>
> On the other hand, a portfolio manager questioned by Claudine Carluer[15] links fast causal sequences in order to explain why, in period of economic growth, he is more aware of interest rates than companies' results:
>
> > "It's obvious. It's what's happening now in the United States. Fast growth, overheating, a rise in interest rates because of inflationary expectations: that it is the current path".

It is not easy to identify social causes of the use of economic reasonings. It seems to depend on the overall orientation of the dealing room and the local position of economic reasoning within the symbolic hierarchy. At UC, the people in the room whose father had an "economic" profession, such as businessman or liberal professional, use economic reasoning more than others (57% of the first group as opposed to 44% of the second). However, these people, over-represented among sales people, perhaps use it more because of their function than on account of their social origins. In the local context of UC's dealing room where economic reasoning occupies a lower position in the symbolic hierarchy than mathematical arbitrage, those with the greatest cultural

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[15] Cf. Carluer (C.), *Le comportement informationnel des gestionnaires de portefeuille. Modèles et croyances*, Doctoral thesis in Information and Communication Sciences, Université de Jean Moulin, Lyon II, 1994.

capital generally prefer to excel in mathematical arbitrage. Sales people, because of their position and career path, manipulate economic reasoning using the culture of the economic world as just another element in their sales pitch.

In the BPP dealing room, on the other hand, which focuses on speculation on currencies and fixed income securities, economic reasoning occupies a more significant position and a higher level in the hierarchy of values. At the time of its morning meeting, traders from this room – often very highly educated (Ecole Polytechnique, ENSAE and a qualified philosophy professor) – compete to perform the best economic reasoning, which, in this case, is more complex and closer to academic discourse.

*Neo-classical reasoning*

In general, when an economic event occurs, it is possible to deduce a number of economic consequences from it, which may be contradictory[16]. Some economists have often pointed out that, when such alternatives occur, the economic reasoning used in the market is generally neo-classical. Some economists have even studied the self-fulfilling nature of neo-classical forecasts made thanks to the financial markets and their belief in neo-classical economics. In her studies of the form of reasoning used by portfolio managers, Claudine Carluer observes that the reference model they use is neo-classical economic reasoning.

A large number of factors contribute to this uniformity of economic reasoning: newspapers, media and official publications which, one way or

[16] As F. Lordon highlights, "immersing the micro-problem of portfolio selection in the macroeconomic system of general interdependences exposes the operators to its ambiguities. Is it not true that disinflation, which allows the erosion of capital to be avoided, maintains high interest rates, which in turn reduces the value of portfolios? Is growth strong enough to make public debt sustainable or, on the contrary, is growth too high, making it vulnerable to inflationist pressures? Is unemployment a factor in social inequality or does it provide a safeguard against the rise in salaries?", Cf. Lordon (F.), "Les apories de la politique économique", *Annales,* 52, 1, January-February 1997, p. 157-187.

another, tend to reflect the "Washington consensus"[17]; the fact that neo-classical reasoning is fairly easy and systematic; and, above all, the need to keep pace with the market and to forecast concurrently with it (or, better still, slightly in advance), as well as the need to forecast the actions of the central banks (which usually have a clear neo-classical structure)[18]. One of several factors that result in an increased use of neo-classical reasoning is its elective affinity with social origins on the one hand (with *economic capital* having greater importance than *cultural capital*) and with the position held (by portfolio managers) on the other hand. Bukharin tried to show that marginalist economics was "economic theory of the leisure class". There is no doubt that this theory, which ignores the specific conditions for the production of academic scientific thought, is simplistic and indeed erroneous, but it may have greater validity for operators who are only half-aware of the consequences of this kind of economic policy. Indeed, these operators usually hail from the more economics-focused sectors of the dominant class – CEOs, managers, liberal professionals, commercial tradespeople – and generally tend to see economics as a juxtaposition of markets in partial equilibrium similar to those in which the paternal company operates. The State is viewed critically; its power is considered disturbing and the fact that it can get into almost limitless debt (at least in temporal terms) is seen as an exorbitant privilege. Keynesian reasoning, on the other hand, is a great servant of the State, almost Hegelian, through which the bureaucrat – by a ruse of reason – uses certain systemic consequences that go against his economic policy and brings about the concrete universal and the happiness of the people in spite of himself.

A witness of this spontaneously neo-classical reasoning, Thierry (an older left-wing trader) had this to say:

> "And then in 1980, when the left came to power, there was a high level of debt and a whole lot of public programmes were planned, which had to be financed. And the State then took the place of everything

[17] Cf. Dezalay (Y.), Garth (B.), "Le 'Washington consensus', Contribution à une sociologie de l'hégémonie du néolibéralisme", *Actes de la recherche en Sciences Sociales,* n°121-122, 1998.

[18] On this point, with regard to the French case see Lebaron (F.), "Les fondements sociaux de la neutralité", *Actes de la recherche en sciences sociales*, 116-117, 1997.

> – normally in economics, only the company should borrow on the capital market and not the State." (Thierry)
> "Debt itself, whether we are talking about the debt of a company, a business or a State, is basically the same thing. As Balladur said on TV the other day, subscribers might wonder, "Will we get our money back?". In fact that is not really the issue – you do get paid back, but in Monopoly money, because the States get further in to debt in order to pay back their debts" (Manager interviewed by C. Carluer[19])

In order to test this tendency to adopt neo-classical reasoning, we proposed two alternative forms of economic reasoning in the questionnaire, which were equally plausible. One is somewhat orthodox and the other somewhat heterodox (or at least Keynesian). From 1994 to 1997, the US rate of unemployment was the variable on which the stock exchange market was polarised. The dominant reasoning was inspired by the Phillips curve, which is a "classical" version of some Keynesian forms of reasoning. According to this approach, there is a decreasing relationship between the rate of unemployment and inflation. Any fall in unemployment was interpreted during these years as a sign of a return to inflation and an imminent rise in interest rates, which would entail a fall in prices[20]. After 1997, as this relationship had no empirical verification, the interpretation lost ground. Some even started talking of a "New Era" in the United States – a new economic era of low unemployment, strong economic growth and low inflation.

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19 Carluer (C.), Le comportement informationnel…, *op. cit.*, p. 190.

20 The basic link between the rate of interest and fixed-rate bonds should be noted. When the interest rate rises, the price of old fixed-rate bonds, whose rate was lower than the new interest rate applicable to new bonds, goes down in order for the interest rate on old and new bonds to be the same. When the interest rate drops, the opposite is true. There is a very strict relationship when it comes to bonds, and also applies to shares, although in a less mechanical way (given the uncertainty of dividends).

*Table 2. Economic opinion of members of the room*

| ***A fall in unemployment in the United States means for you:*** | |
|---|---|
| A rise in salaries, thus in inflation, thus in interest rates, thus a *drop in prices*. | 45% |
| A rise in consumption, thus in profits, thus *a rise in prices*. | 29% |
| (Ticks both answers[21]) | (5%) |
| No answers | 18% |

| ***A rise in public debt means for you:*** | |
|---|---|
| Revival of activity, rise in future profits and thus a *rise in prices*. | 10% |
| A rise in public debt, thus a rise in interest rates, thus a *drop in prices*. | 56% |
| (Ticks both answers[22]) | (5%) |
| No answers | 29% |

Given that the news regarding the unemployment rate sparked such a reaction in the market, the non-response rate (18%) was lower for this question than for the question concerning the public deficit (29%). While the neo-classical answer was the most popular (45%), the alternative answer was frequently selected (29%), maybe because unemployment failed to have an impact on US inflation. Some (5%), perhaps with a better understanding of economics, ticked both answers and sometimes gave self-referential explanations in the margins.

The question on the rise in public debt was less striking to the members of the room. Apart from Japan, where a public revival of the economy was attempted a number of times, and some of the revival plans could have brought about a rise in the markets, the budgetary revival had not been on the agenda in the OECD countries since the beginning of the 1980s. On the other hand, the disengagement of the State became the standard for good economic policy. The members of the room incorporated this standard because, in their answers, they generally chose the orthodox vision over the Keynesian one.

[21] Some even specified in the margin, "It depends on what conformists think at moment *t*: don't piss into the wind" (1 person), and "It depends on the market situation" (1 person).

[22] Also "It depends on the market situation" (1 person).

***Table 3.*** *Proportion of people who expressed an orthodox opinion as regards the two questions of economic forecasts (i.e. "both") according to their annual salary.*

| Salary | Proportion |
|---|---|
| Less than 250 000 F | 36% |
| 250-350 000 F | 44% |
| 350-500 000 F | 55% |
| More than 500 000 F | 67% |
| No salary declared | 29% |
| All (n=94) | 40% |

To gain a better understanding of what motivates orthodox opinions, we drew up the following table showing the proportion of people who expressed an opinion that was orthodox or in line with the market[23] according to annual salary levels. This proportion clearly increases in line with salaries. Seniority in finance, income and hierarchical positions are quite narrowly correlated. Everything occurs as if the propensity to be "orthodox" increases along with one's integration in the financial world (it is common to see the answer "both" from those earning more than 500,000 francs a year). The answers given by junior empoyees depend more on their preliminary knowledge of economics (the economics taught in school is more Keynesian than that used in the dealing rooms), or even on their political or ethical convictions. In the ordinary world, any fall in unemployment is thus considered "good" and any rise is "bad". Junior employees may think that what is "good" in the world of politics and economics must be also "good" for the market. With a little experience, they learn that the opposite is true (during the 1990s at least). Initially shocked[24], they eventually get used to such a sequence of economic consecution.

Even if the tendency to use orthodox reasoning is very strong and is

[23] That is, those who checked both boxes and specified that "it depends on the context".

[24] "*Does working on the financial markets pose a moral problem for you?*" – "No, I wouldn't go as far as that. It's true that when a company reduces its workforce its share price rises. That's quite a strange reaction." (Delphine)

reinforced through integration into the financial world, one should not think that economic opinions all are uniform or all neo-classical. It is important to remember that the consensus is all the more difficult to establish because the human group is so large. As Baker showed[25], the larger the group of traders in a pit of options quotation, the more cliques are formed, the greater the dissensus between the cliques and the more volatile the price of the option. Moreover, some economists observed that on many markets, if economic reasoning and future forecasts were identical, there would be no possible transactions. Sometimes, when some anticipated figures are announced, the market has a short period of hesitation. It often heads in one direction and then makes a sudden turnaround. This phenomenon is due to the unequal financial power of people who interpret the figure's impact on the price differently.

*Economic reasoning as an unconscious exercise of semiology*

As Claudine Carluer explains, even if the types of reasoning are integrated into a stable and homogeneous neo-classical reference model, the particular reasoning of portfolio managers is unstable and multiple[26]. The great variability of the types of reasoning within the dominant referent is partly due to the cycle of figures selected by the market[27]. This cycle of significant figures also corresponds to a cycle of economic causal reasoning, which at a given time will appear significant, more significant than those underpinned by other figures

25 Baker (W.), "The Social Structure of a National Securities Market", American Journal of Sociology, 89 (4), 1984.

26 Carluer (C.), Le comportement informationnel…, *op. cit.*, p. 224-225 et 252.

27 A figure is considered important for the market when the market reacts strongly to its announcement: "It is true that there are statistics that are particularly significant, such as the trade deficit in the United States, the consumer price index, wholesale prices and retail prices, while money supply is not considered so important today. At one time, it was very important. Ten years ago, it was a key weekly figure in New York and the United States. I don't know if you could call it a fashion, but every Wednesday we looked at money supply data. Now, it's the trade deficit [...]. At certain times, you realise that the trade deficit in the United States is a problem that was buried for a long time and then resurfaced. Since some of the banks collapsed, people have understood that it could cause serious problems and started to focus on it". Interview with A. transcribed by Carluer (C.), Le comportement informationnel…, *op. cit.*, p. 324-325.

which no longer move the market.

However, the instability of the reasoning is not due solely to the instability of the market itself, but to the type of reasoning. As Claudine Carluer observes, economic reasoning is relatively simple and unilateral: "They are pronounced in a manner that leaves room for neither doubt nor contradiction, and they are relatively short and simple"[28]. The reasoning used generally consists in either "considering the direct influence of the economic indicator" on the price or "considering its influence through the influence it exerts on an intermediate element"[29] – generally interest rates. This type of highly economic reasoning enables very swift intervention in the markets and allows people to seize profits before they disappear. However, it also favours the formulation of causal chains that can become contradictory.

> In the following example, the portfolio manager almost contradicts himself when he answers two questions in succession on the influence of growth on the stock exchange market. In the first case, the fall in the unemployment rate means economic growth, a rise in interest rates and thus a fall in the markets, and in the second case, a rise in production implies economic growth, profit and a rise in the market.
>
> > *"For stock exchange markets, is a strong increase in job creation a factor that causes an economic rise or fall? Why?"*
> > "Boosting job creation is a factor that causes a rise in interest rates, which implies a fall in the market, and so it means both a rise in interest rates and a fall in markets. I would say job creation is synonymous with growth. Synonymous with growth means synonymous with inflation, and where there is inflation there is risk... a bit like what occurred in the United States recently, a risk of inflation and so a rise in rates and thus fall in the markets (...)"
> > *"For the stock exchanges, is a rise in industrial production a factor that causes a rise or a fall? Why?"*
> > "A rise in industrial production means growth; where there is growth there is an improvement in financial results and the markets are quite keen on that."[30]

In this example, the portfolio manager uses the term "synonymous" to characterise the stages of his reasoning. Undoubtedly this is just a manner of speaking, and he could easily have used a more scientific term such as "implies". Beyond the contingency of the terms employed, however, we may

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28 Carluer (C.), *op. cit.,* p. 235.
29 Carluer (C.), *op. cit.,* p. 236.
30 Interview with C. in Carluer (C.), *Op. Cit.,* p. 352.

consider that by using the word "synonymous", this person is unconsciously telling us the truth about the exercise of economic reasoning in the dealing rooms, where the economic analysis of ordinary operators may be compared to an unconscious exercise of semiology: it is more an investigation into the connotation of the terms of economics or economic policy than a rigorous exercise in establishing macroeconomic sequences.

The spontaneous schemas of interpretation of economic information are added to a vague knowledge of economics. When economic figures are announced, they allow an automatic intervention, without reflection, so as to get off to flying start, as it were"[31].

> Ivan had a small "spiel" portfolio (an authorisation to speculate with the funds of the bank without being covered). But he had to remove this "position" because he faced some losses on CAC 40 futures. He tried to speculate on one of Jospin's important political speeches. Nine times out of ten he won, but at the tenth try he lost everything. He believed that what Jospin had said was bad for the market (thus he sold), whereas it was bullish.

These schemas are organised. Anything that could be interpreted as a *threat* to monetary stability in the economic policy figures or speeches will be interpreted as a factor causing a rise in interest rates and a drop in prices. On the other hand, anything that resembles a *calming* allows a fall in interest rates and a rise in prices. Thus "fall in prices/rise in prices" pair is partly determined by the paradoxical schemas of *tension* and *relaxation*, *threat* and *calming*.

## 3. A pagan knowledge: charts.

While mathematized arbitrage and economic reasoning are, to some extent, linked to academic knowledge, chartist analysis, on the other hand, also known as "technical analysis", is an indigenous knowledge with no academic extension. It is a relatively old technique. Charles Henry Dow (founder of the Wall Street Journal and the father of the Dow-Jones index) invented it in the

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[31] Keynes (J. M.), *Théorie générale de l'emploi, de l'intérêt et de la monnaie*, Paris, Payot, 1971.

late 1880s[32]. It spread in the early 19th century mostly thanks to William P. Hamilton, Dow's successor as editor of the Wall Street Journal, who was able to predict the stock market crash of 1929 thanks to the method. In France, it was not properly adopted until the major transformation of the financial markets in the middle of the 1980s. Dealing rooms organised according to the American model, with their operators often coming from Anglo-Saxon countries, were a more favourable place for the importation and spread of such techniques than the traditional stock broking agency.

The general principle of technical analysis is to try to predict future prices from past prices. Chartists therefore try to detect trends and typical configurations (frame 2). This type of forecast, although used in many academic fields such as economic forecasting – with its time series and econometrics – is regarded by dominant neo-classical economics as being irrelevant in the financial field. According to neo-classical economists, since prices will immediately reflect all forecasts by all financial agents made on the basis of all available information, only new information, and not past information such as the shape of prices, can lead to a change in prices. The result of this reasoning is that it should be impossible from a theoretical point of view to predict prices on the basis of past prices.

[32] Nonetheless, it would seem that the "Japanese candlesticks" technique had been used in the rice futures market in Japan since the 13th century. Cf. Tvede (L.), *La psychologie des marchés financiers*, SEFI, "Finance", 1994, p. 67.

Frame n°2: Chartist techniques.

There are several chartist techniques, each of which has its followers and can be used in combination with other techniques: graphic representation techniques such as bars and lines graphs (the most commonly used), Japanese candlesticks, or points and figures; various remarkable figures such as support and resistance lines, head-and-shoulders, V formation, W formation, triangles, inverted triangles, "flag and pennants", ascending channels, gaps; waves forecasting techniques using the Elliott wave principle or the Fibonnaci numerical series; trend indicators such as moving averages, etc.

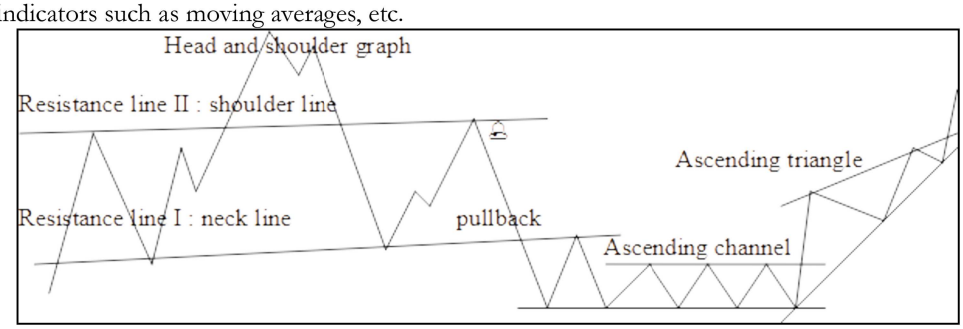


*Figure 1. Prices with some basic chartist figures.*

The chartist technique of resistance lines is at the origin of many chartist figures. They consist in isolating some maxima (or some minima) and in plotting straight lines between these two maxima. These lines are called "resistance lines" (or support lines), and the price is supposed to bounce against these so-called lines. For example, in the case of an ascending triangle or an ascending channel, the price remains confined for a time between the two lines of resistance. In this case, it is said that the price "tests the line". However, it can just as easily "break the line" (for example at the end of the ascending channel). Technical analysis is used to locate significant points. The reasoning is an either/or type. Either the price tests the resistance line and returns to its previous level, or the price breaks the line and will strongly rise (or fall). For example, the head-shoulder graph serves to identify the major trend reversals (which chartists have done retrospectively for the 1929 and 1987 crashes). When both a neck line and a shoulder line can be observed, showing a kind of head (where the small bell is located on the diagram), it seems to be possible to predict a severe crash after the neck line has been cleared once again.

Elliott waves are a collection of "rules" which are supposed to predict the succession of "waves" (a wave is a price movement consisting at least in a rise and a fall, but may be more than this). It is supposed to be a "philosophical" method. Here are some examples of these very strange rules: "the third wave is never shortest", "the second wave never traces more than 100% of wave I", and so on.

Moving averages are a well-known method of studying time series (in history and statistics) because they have the advantage of smoothing out discrepancies and determining trends. However, chartists' use of moving averages is rather odd. For example, chartists use two moving averages (a 10-day short-term one and a 30-day long-term one) and use sayings such as "when the short-term moving average breaks above the long-term one, it is a sign of a rise" (also called "golden cross"), and "when the short-term moving average breaks below the long-term one, it is a sign of a fall" ("death cross").

To understand its success, one should not, like the neo-classical theorists, reduce chartist analysis to a simple linear interpolation of past prices. Rather, it is a subtle art of interpreting prices based on the recognition of forms and the search for the appropriate saying. The difficulty with technical analysis based

on resistance lines stems entirely from the fact that it is possible to plot a large number of lines, which will eventually become irrelevant. Often, chartists state that they need to have an idea of the market's evolution before checking whether this idea is confirmed graphically by a series of lines.

Like parascientific prediction techniques, it makes it possible to offer two differently evolving scenarios and still convince the other person. Just as brokers reassure their clients while avoiding the risk of being mistaken by maintaining that "prices will rise unless they fall"[33], so modern chartists are experts at offering several alternative scenarios, depending on whether a particular level of resistance is tested, retested or broken.

> Ronan, after finishing business school and obtaining a Diploma of Advanced Studies (DEA) in stochastic mathematics, was hired at UC where his predecessor in the room taught him technical analysis. His principal work consists in envisaging future trends in the markets with the use of chartist techniques, and explaining his forecasts every morning (in English) at the morning meeting.
>
> On 20th December 1997, he made the following forecast for the CAC 40, which had closed at 2822 points the previous day. He envisaged a fall that should either stop at 2812, or at 2784, or in the worst case at 2650, unless prices should rise, in which case it would reach 2857 or 2885:
>
> > "In the longer term, an interpretation of the rise from a low of 2475 still favours the X-wave (min: 2880 already met, norm: 3000, max: 3100). The major downward movement seems to confirm: caution. The risk is a retest of the 2650 area.
> > In the short term, a downward movement seems to confirm: a break below 2812±4 will target 2784±2 then the 2650 area.
> > If an impulsive downward movement is on the horizon, 2857±7 must remain unchallenged. Be aware that a break above this level will target the 2885±3, which, if broken, would invalidate the immediate downward structure."

Even if it formulates several contradictory strategies, technical analysis brings financial profits, because it enables operators to prepare financial orders at key points, which are often important for the market.

### *A popular technique*

In the dealing room of UC, 41% of the population use technical analysis, 16% because everyone else does so, 21% because it works and 3% because it is

[33] Roman (A.), *Un grand financier*, Roman (essai d'initiation financière), 1922.

scientific. The majority use resistance lines (26% of the population) and Elliott waves (24%), followed by moving averages (14%). However, exotic methods such as point and figure charts and Japanese candlesticks do not receive many votes. The members of the room generally learned these techniques alone (7%) or thanks to the presentations given by the company analyst (17% of the population). Only 4% of them learned these techniques at university.

The probability of using technical analysis depends on the position held within the dealing room. The traders use chartist techniques the most (63% of them), almost as much as economic analysis. Sales people (58%) also use chartist techniques to develop their sales pitch and convince the customer. Other people who carry out fewer market operations use it very little. The position held does not entirely explain the use or non-use of "charts" (see frame 3).

The position held by an employee does not entirely explain their use or non-use of charts. Depending on their social and academic origins, the members of the room acquire dispositions that encourage or discourage the use of these unscientific, quasi-proverbial formulas, all the more so given that these techniques compete with and sometimes contradict nobler, more legitimate techniques in the academic hierarchy. 50% of the children of liberal professionals and 46% of the children of businessmen use the charts, as opposed to 36% of the children of engineers. The most highly educated people and those from educated families feel reluctant to use such a rudimentary technique in comparison with mathematical arbitrage or economic analysis. On the other hand, people from more working-class backgrounds can make (excellent) use of technical analysis as a way to compensate for their lower ability to carry out more academic reasoning.

Moreover, technical analysis – which is far from being a divinatory, magical or religious art in the sense that it is not holy as such – appears more as a

*technique* similar to the rules, proverbs and tricks contained in the almanacs of the agricultural world. One can understand, therefore, why this proverb-based technology is embraced more readily by those with less cultural capital.

Frame n°3: The use of chartist methods

*Table 4. Probability of using Elliott waves: Rough ratios and "*ceteris paribus*" effects.* [34]

| Explanatory variables | | Rough ratios | "*Ceteris paribus*" effect | |
|---|---|---|---|---|
| **All (n=94)** | | **24%** | | |
| Function | *Sales person* | **36%** | +19% | ** |
| | *Trader* | **42%** | +16% | * |
| | Others | 10% | -10% | *** |
| Diploma | ≥ Baccalaureat + 5 years | 17% | -3% | |
| | < Baccalaureat + 5 years and diploma unavailable | 29% | +2% | |
| Experience | > 4 years in finance | **40%** | +13% | ** |
| | ≤ 4 years in finance | 12% | -7% | ** |
| Gender | Female | 17% | +1% | |
| | Male | 27% | -0% | |
| Father's diploma | ≤ Baccalaureate | 30% | +5% | (*) |
| | > Baccalaureate and diploma unavailable | 21% | -4% | (*) |

A regression model for the use of Elliott waves*, one of the more "philosophical" methods,* enables us to see the determinants of the use of charts. The person's function – sales person or trader – is one of the most significant factors. Being integrated in the financial world, measured by the dichotomous variable "having or not having four years of seniority in finance", strongly increases the "*ceteris paribus*" probability of using Elliott waves. As these techniques are only learned in dealing rooms, it is fairly normal that seniority favours their use. One can also see that the higher the cultural capital, the lower the probability of using "charts". Thus, having a diploma higher than or equal to the baccalaureate + 5 years of study creates very slight discrimination *ceteris paribus* against the use of charts (not particularly significant in the regression model), while the fact that the father holds a low-level diploma (inferior to the baccalaureate) quite significantly increases the gross probability and the net probability *ceteris paribus* of using the Elliott wave principle. Those individuals from working-class families or from a background in which economic capital is relatively more important than cultural capital are capable of showing economic goodwill and therefore adopt the techniques that work easily, even though those techniques are unworthy of people who are capable of cultural goodwill and who are more attached to academic knowledge.

## *Controversies over the capacity of the charts*

One of the characteristics of chartist analysis, unlike other methods, is that people always have a strong opinion on it. It has both its detractors and its advocates. Ronan, the specialist, defends the validity of his technique although he acknowledges that it is a "psychological" phenomenon and that many

[34] See footnote 9.

people in the UC dealing room might deliberately do without it, relying instead on their own very clear intuition. Technical analysis works if people know how to use it, he claims; in that case, there is money to be made from it and so naturally traders use it. He only bemoans the fact that CU favours arbitrage and thereby renders his role insignificant. He would therefore prefer to work in an American bank that implements a proper policy of speculation.

> Some, like Patrick, who can be characterised by his economic goodwill, are fascinated by the forecasting capacity of charts. They are prepared to work hard in order to learn an economic technique that enables them to make large sums of money, in spite of its dubious foundations.
>
> > "In fact, it's true that people do listen to the chartist, because the fact is that he's good! [...] He's very good and I must admit that I listen to him as well. Well, I used to listen to him, but he died not long ago. He was very, very good, and everyone listened to him. He was right 70-75% of the time! That's huge! When he used to say, "OK, so this goes like this, and afterwards it'll go back up...", and you knew that nine times out of ten he was right. So everyone listened to him and everyone used to go and see him. Sales people as well as traders. They'd go and say, "Look, what do you think? I'm exposed here, I've got this client, should I wait?" He was really good... [...] It's true that when you look at charts, you think that they may even be too powerful. You could almost forget about economic analysis and only trust chartists' analyses, because they are so powerful".

Others, like Thierry, categorically refuse to use charts and restrict themselves to the techniques they can use with great precision.

> Thierry's situation is ambivalent. In a way, his social origins and career in the financial markets are conducive to the use of charts and even to his developing real expertise. However, Thierry started working in the world of finance well before charts were used (in France). He developed great skill in economic analysis and, in a way, is proud of his superior knowledge. Switching to charts would be tantamount to invalidating his field of expertise. Despite everything, he is not entirely confident about the legitimacy of his knowledge and, as an authoritative argument, he puts forward the "clear opinion" of an engineer who graduated from the École polytéchnique/ENSAE and who is said to know about the legitimacy and validity of the methods of economic forecasting. Thierry's position is rather like that of the old workers who refuse to use new work tools. He is also slightly disappointed that the young Quentin – a qualified philosophy professor with whom he could have established a kind of alliance in the room, based on their shared opposition to the engineers, and to whom he passed on a great deal of knowledge – has also switched to using charts, albeit sporadically.
>
> > "Doesn't the chartist's presentation at the morning meeting get on your nerves?"
> > "Yes, especially as he's always the last to arrive, right when I want to leave."
> > "I know!"
> > "Yes, it annoys me. But I'm not the only one. Basically, no one listens. I

> think people are kind of half-listening!"
> "And is he any good?"
> "Yes, I suppose he is... In the end, charts are just... well it's like looking in the rear-view mirror. I've seen him say, 'Yeah, we've broken above this point, we had a bad closing' and it's just bad luck, nothing happens or the market keeps going up anyway or starts to pick up again... But it's OK, there's no problem. There's nothing we can do about it. Quentin was looking at the charts."
> "I know!"
> "Well in his case, he doesn't really believe them either. He's one of those people who look at them anyway because he tells himself he's used them sometimes. Good for him."
> "Doesn't it annoy you that he's gradually switching to chartist analysis?"
> "I don't like it much [...]."
> "Have you ever used moving averages?"
> "I remember a trader, a friend, who said something to us about the US market one day, and we had a good laugh. "We've broken above the 50-day and 200-day moving averages, it's chaos". And eight days later, the market went up three points. And he lost a lot of money because he'd gone short. And we'd broken above the moving average. The moving average is a bit like looking in the rear-view mirror as well. It's useful when everyone is looking at it, a bit like with charts. If people say 'We've broken above this moving average and that's going to take it up'... people sell. So they drive the market down."'

Those who have the most cultural capital defend their use of charts but are aware that they are in a similar situation to that described by game theory, and so they also explain why they look at them despite everything. Quentin, therefore, in order to distance himself from chartist technique, gives a theoretical presentation that enables him to state that charts are a stupid, sheep-like method but that they do work: he believes this is a false rationalisation that frees people of the responsibility of making decisions, because the fact that they are adopted by a large section of the market gives them a self-fulfilling nature.

> "Chartism is being introduced at the BPP at the moment. The tradition [at the BPP] is to make fun of it, but to look at it anyway because you have to. In theory everyone finds this absurd! But at the same time, you can't deny the self-fulfilling nature of the charts, and so we look at them. For example, I don't think anyone at BPP is stupid enough to sell because the charts say to sell. On the other hand, most of those who want to sell will wait for a point on the chart before intervening. I'd say it's tactical. But that's not going to make you buy or sell. It's really just to reassure you. No one is fooled, apart from the company chartist. It's a question of pretending to believe him, whether or not he holds his own. After all, everyone makes his own charts. The further you move along the curve (I was protected, in a way, because I was on short rates and the central banker doesn't follow chartist logic), the further along you move

> and the less ground there is. People are asking, 'Are US rates 6% or 5%?' Honestly, no one has a clue. And everyone admits that when you buy or sell, you have a 50-50 chance of winning or losing. To a certain extent, everything comes down to chance. Charts are one of those false rationalisations that enable people to make a decision. It's completely psychological. And there's a mass effect behind it; for example, imagine I want to sell if I know there's a point everyone's watching. If I sell at that level and the point has sunk, I could get out quickly if I've understood that it's not going down even though everyone has done the same thing as me. So I'd lose less if I sold for less. That sort of thing. And of course, it's incredibly foolish, because all the guys who've sold at that level know that if it's broken above that level then they have to get out, and that has a snowball effect. So I'd have lost a lot of money. But I wouldn't have lost so much if I'd traded blind, knowing that it had broken above that point and that I'd sold earlier, that despite everything there's some air and I can get out higher up. Of all the different forces that make up the market, only traders look at charts. In other words, if I'm an insurer and I've had cash flows and want to buy some ten-year US options, I'll go ahead and couldn't care less if I buy at 6.01 or 6.005 or 6.015. It's nothing to do with the investor [...]. But that's not a BPP tradition. There are banks where it's vital. If there's a BPP tradition, it's more about [economic] analysis".

For operators who do not like this technique and for economists who study finance, the fact that charts work is rather mysterious. It is not enough to simply denounce the stupidity of the technique. It is also necessary to be able to provide real reasons as to why technical analysis works on the basis of bad reasons. Some will explain charts by their self-fulfilling nature. Others will explain why there are trends. Others will say that some chart figures work because of insiders' action (for instance, movements such as an ascending channel), etc.

> Maël believes that charts are merely the graphic expression of an idea people have of the market, and he thinks it is more important to understand why people have a particular idea of the market rather than trying to reassure oneself by plotting resistance lines.
>
> Rémi, a trader and head of desk at BPP, believes that some economic trends encourage the formation of trends in stock prices. He explains that the central bankers' decisions to lower rates are not stochastic but rather are made on the basis of major trends, and that those major price trends can be identified through chartist analysis.
>
> Ludovic likes charts and finds them entertaining. He explains that charts often work because of insider trading. When there is an ascending channel preceding a sharp rise (see Figure 1), he claims that it is due to the fact that someone has information and is systematically bringing in securities while being careful not to make prices rise too high. When the information is made public, a very sharp increase follows.

It could be said that economists have not completely solved the reasons

behind the power of technical analysis. The economists who developed the assumption of efficient markets denied it had any validity and considered that money made from technical analysis is simply due to a random distribution of profits. Many economists are not so categorical today, and heterodox economists, thanks to financial successes brought about by technical analysis, denounce the empirical fragility of neo-classical theories. In general, heterodox economists consider that technical analysis is a self-fulfilling phenomenon, the simplest model of which is the "rational bubble". We cannot doubt that most of the success of technical analysis comes about from this kind of mechanism. And if ever astrology, recently introduced on the financial markets, manages to be so successful, we will see a confirmation of the possibility of self-fulfilling phenomena. The problem, however, is that "conventionalist" theory cannot explain how people adopt this technique and why some individuals on the market will use some techniques that are very rare. As shown here, there are social reasons that promote the adoption of such techniques. A dialogue between economists and sociologists would help to reveal more about the reason for such an adoption.

There are no doubt social, historical and cultural reasons – some of which we have already highlighted – that encourage people to adopt these techniques. There may also be economic reasons, other than self-reference, which explain the relevance of charts. The techniques of fixing orders, bracket management and the common practice of buying then getting out at a lower price then buying back at a lower price and reselling a little higher all encourage yo-yo trends and perhaps provide the support lines plotted by chartists. Some chartists even claim they can predict past price trends retrospectively (those of the South Sea Company, for example), from an era when chartist techniques did not exist. If this is true, financial economics could try to bring to light other reasons for using charts (if any exist) apart from self-fulfilling prophecy alone. If the economic sciences were to make this kind of clarification it would allow a better understanding of the social reasons that promote the use of

these pagan techniques.

## 4. Between Reflexivity and Feeling: Hybrid and Non-Stabilised Forms of Reasoning

### *The limits of reflexivity*

In economics, it is common to believe that market players take account of the strategy of other players when formulating their own strategy. Formalised in the framework of game theory, the players are supposed to calculate the point of equilibrium (i.e. the Nash equilibrium) of other actors' strategies and take these into consideration. This belief tends to attribute the actors with a capacity to calculate and totalise that is out of touch with market practices. While it is not incorrect to say that players do take account of other players' strategies, most of the time traders ascribe rather limited reasoning ability to the partners they imagine to be operating in the market. Patrice, for example, sitting in front of his screen, lacks information (in this market, unlike in others, there are no identification numbers enabling him to recognise those who are offering to buy or sell) but after a year in the field he is able to recognise his competitors' strategies fairly easily: "The guy's accepted... he's going to list", he exclaims while looking at the price field, thereby implying that there is a lone "guy" manipulating the market. This is his way of making sense of a series of buy and sell orders, transactions and prices, and to identify a single source of action and to ascribe a true intentionality to this alter ego with whom he has built up a kind of virtual social connection.

With calculation, one does not go as far as one would in a balanced game theory and, in general, the imagined game partner is seen as a rather limited individual. This imagined "other" is usually indistinguishable, collective, somewhat sheep-like and limited, but potentially an insider[35]. When describing

[35] Rose (A.), "A Social Psychological Approach to the Study of the Stock Market", *Kyklos*, 19 (2), 1966, p. 267-287 wrote: "There is one topic of conversation which is constantly returned to, and about which much rumor develops. This topic is the myth of 'They' and what 'They' are saying and doing. 'They' are supposedly the insiders, but just specifically

others who operate in the market, a plural term such as "the guys" is often used, indicating both a lack of distinction and a male-centred view. In order to highlight their sheep-like, stupid or incomprehensible nature, it is very common to make a comparison using "like" followed by a derogatory term, for example "like crazy" or "like idiots":

> "The bastards have gone and sunk the market"; "Some jerk's gone ahead of me" (Patrice): "There's a rumour that people have lost it over Paribas warrants" (Etienne); "People have gone short like crazy on Disney" (Damien); "You idiots can just buy or sell or do whatever the hell you want"; "I knew they were gonna sell like morons"; "They're gonna sell like jackasses" (Quentin); "People sometimes go crazy buying or selling" (Trader interviewed by Nicolas Thomadakis and Zakaria Benjazia).

Without doubt, the systematic references to idiocy, madness or any other defect that limits people's ability to reason serve as a means of representing all the types of behaviour that prove impossible to predict, in order to provide reassurance and to better understand them. Despite the important role played by chance in price movements and therefore in the winning and losing of money, the financial world is pictured as a game, a joust, in which one must be the strongest – in other words, the "most intelligent", with "the best reasoning" in order to "make forecasts before everyone else does":

> "I think that one of the challenges I face on a daily basis is how to be more intelligent than the rest. When I win (in other words, when I succeed in getting someone else's money), I tell myself that I was more intelligent than the others" (Trader interviewed by N. Thomadakis and Z. Benjazia).

For these players, taking into account the strategy of others, as proposed by game theory, leads to an abyss. How can participants be scrutinised, categorised and described? What behaviours should be attributed to them, and what capacity for calculation? Far from Nash equilibrium calculations, the reflexive reasonings of the actors bear more resemblance to a kind of "literary" and impressionistic commentary on the market's behaviour, for which they invent – as support points for their reasoning – these limited social figures with a simple, unilateral form of behaviour. However, in many cases,

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who 'They' are, no one ventures to say".

the reflexive invocation of the self-referential nature of the market is nothing more than a regulatory horizon, a kind of statement of intent that is taken no further in the reasoning. Traders, usually ready to acknowledge the self-referential nature of the market, nonetheless easily make the leap from one framework of reasoning, in which this trait is vital for implementing their strategy, to the entirely different framework of mathematical arbitrage, economic reasoning or, even more so, of chartist analysis, where it no longer has any practical impact[36].

*The ambiguity of feeling*

In practice, when predicting the strategy used by other actors or the future movement of the market – that great single and collective entity – traders often rely on a sense of the market that they themselves refer to as "feeling". Far from mere intuition, this feeling is an imprecise blend of various forms of reasoning – from heterogeneous sources – as well as market habits, knowledge of market configurations and more "tangible" intuitions.

Although we have distinguished between the different winning strategies and presented, as polar opposite cases, the virtuosos of each of the very different techniques, we should not, however, think that these techniques are incompatible and that some people remain impervious to the forecasts made by one or other of them. In fact, in the everyday environment of dealing rooms, the different approaches merge together. The very structure of the morning meeting – in which, one after the other, the economist gives a presentation, the traders provide a summary of their desk's activities and, finally, the chartist presents a technical analysis – forces the traders, whether directly or indirectly, to take into consideration all opinions on the market and to successfully settle on an average opinion. Similarly, during the day, by

[36] If we attributed the adoption and validity of charts to the power of the assumed self-fulfilling prophecy alone – as many economic models tend to do – we would be ignoring certain elements of the adoption dynamic. For example, how can one explain the fact that some chartists focus on the rarest chartist techniques?

reading the many different financial newspapers such as *Les Echos*, *La Tribune* and *The Wall Street Journal* as well as the information provided by Reuters, Bloomberg and other computerised information systems which, themselves, give a summary of some of the judgments made by opinion-makers, traders are forced to form their own view or adopt one that has already been put forward in the market.

In using the term "feeling", traders merge and syncretically present a number of techniques that have in common the fact that they are relatively intuitive and inexplicit. In addition to the natural recognition of chartist forms of activity, the use of economic information read but already forgotten and the art of manipulating a market in order to increase or reduce prices, we find the semi-intuitive prediction of what others and the "market" are doing, which enables traders to anticipate a sell-off:

> "You're aware of something. It's not enough to be well qualified. You have to feel the market! You have to feel it when people want to buy, you can feel it when there's going to be a sell-off."
> "*How do you feel it?*"
> "Well, it's a kind of force, and earlier, the prices dropped then went back up a bit and we could sense that things were about to pick up again. And they did. Now, there are things that drive the market; you've got sellers placing orders, for example, who say, "I'm going to limit the damage at this point", and so he places some stop orders. He's a seller, so he places a stop order. And when the market gets the better of him, the market goes up when his stop order is executed. Those orders drive the market up even higher. That's what you feel, sometimes you can see the market... You know that the market moves tick by tick, then suddenly it shifts by seven or eight ticks and no one knows why. Well it's because a stop order has been executed and that always brings in other buyers. And these are noise trader markets [...] You know, you've got people behind their screens saying, "Well if it goes up I'll buy some".
> "*Do you do that?*"
> "Yes, I do it as well. Of course I do. But I take a more basic position." (Thierry)

As far as Louis is concerned, "feeling" is a means of combining more solid blocks of reasoning, whose consequences are potentially contradictory, and to draw a conclusion from them:

> "There is a discretionary power which is common sense, "feeling", experience or know-how. Let's say that to start off with you always have a certain idea about the market. Then you cross check with the expert

> systems to see if your idea is confirmed or not. And depending on that, you either go ahead or you don't. For example, I know the dollar has fallen a lot over the last few days. People have been wondering if it was going to break through. And I looked at my technical indicators [i.e. charts], but none of them told me that the dollar was going to fall. As I'm not bearish on the dollar, I said we're not selling the dollar."

For traders, following their "feeling" is also a way of asserting their autonomy and protecting their discretionary power from the growing influence of technology and mathematics. Indeed, if the winning strategy is easy to grasp, it can be disseminated and passed on to other traders, which means the inventor of the strategy loses his monopoly over the technique and, once it has been passed around, there is a chance that the strategy will become less effective. Worse still, if a model can be developed from it, the technique could become computerised, in which case it would be the computer rather than the person that would make money. Just as older workers are reluctant to disclose their techniques to the engineers overseeing the work, so traders can, in order not to reveal their methods, attribute their winning strategy to "feeling":

> "Once again, it's not a question of knowing whether or not it works. They are indicators we use to make a decision. I'm the one making the decision. Is my decision-making process the right one? If you ask me if I've developed a kind of expert algorithm or Martingale system, the answer is no." (Thierry)

## 5. Overview.

A description of the various forms of reasoning and of winning strategies shows that, despite the option of using them in combination and despite traders' frequent changes of strategy, they are relatively differentiated. It is therefore possible to describe the dealing room as a competitive space for the appropriation of economic and symbolic profits, which, in this world, are almost entirely mixed up. The following multiple correspondence analysis gives an overview of the orientation of operators in this true bazaar of rationality.

Frame n°4: The space for winning strategies

In this multiple correspondence analysis, the answers to the following questions were used as active variables: attending the morning meeting (always, sometimes or never); the usefulness of presentations given by economists, chartists and colleagues; the use of charts; the chartist techniques used; the reasons for their use (speculating, forecasting price movements, finding the right moment, seeking reassurance); the means by which these were learnt (presentations, university or self-study); the use of economics; the orthodoxy and heterodoxy of opinion on the effect of debt and unemployment on prices; the type of economic information used; the use of complex mathematics; favourite type of prices.


*Figure 2. Multiple correspondence analysis of the winning strategies*[37].

In this multiple correspondence analysis, axis 1 contrasts the most integrated on the right with those who are least integrated on the left. Axis 2 contrasts various forms of strategies,

[37] *Active variables are in black; supplementary variables are in italics.*

technical analysis and mathematics at the top, with economic analysis or the absence of any method at the bottom. In fact, this multiple correspondence analysis allows four areas to be quite clearly distinguished. In the northwestern area are the mathematics virtuosos who can demonstrate or modify Black-Scholes relations. These technicians of volatility can use fine arbitrage so well that they are able to confront the low volatility that brings smaller profits. Like those in the southwestern area (who do not use mathematics at all), people in the northwestern area use neither charts nor basic economics. They do not go to the morning meeting, and they find the presentations made in the morning meeting to be of no use. They tend to have a heterodox opinion on the impact of public debt and unemployment on prices.

In the northeastern area are all the experts of chartist techniques. Those who use the rarest techniques such as Japanese candlesticks, points and figures, and moving averages are generally self-taught and use them to speculate. These chartists can make money under difficult conditions such as stagnation or a fall. Even if they do not seem to know much about economics, they also use economic analysis because it works. They use mathematical relations as well, but they only can interpret relations or use them in a push-button way. In the southeastern area are those who use economic reasoning. Some would say they use economic reasoning because it is scientific. They can give orthodox answers to macroeconomics questions and are interested in all kinds of economic information such as take-over bids, dismissals, etc. They are informed about all the possible techniques through Bloomberg, Reuters, newspapers, and so on. If they use charts, it is rather because they say that everybody else does so. They are structurally rather bullish.

The study of supplementary variables allows us to see the good juxtaposition of working positions and desks with the different winning strategies. To the far left of the first axis are employees in less dominant positions, such as back-office staff with no real access to the market. In the north-west, we see engineers, often from minor engineering schools, who work on the engineering desk. In the south-west are those who use almost no methods, such as heads of desk, women or the securities lending desk (which remains closer to economic analysis). Most of the traders and trading desks are in the north-east, as well as the sales desk for listed options products (made up of former open outcry traders), whereas most of the sales desks and sales people are in the south-east. The hierarchies according to seniority and salary are projected along axis 1.

A principle of orientation in this bazaar of rationality could be the search, whether conscious or unconscious, for lower costs, since operators tend to use the techniques for which they have the greatest affinity, *capital* and dispositions. Rather than the initial amount of *capital*, it is the *total investment amount* that seems to govern orientation in the dealing room – investments that can confirm the initial *capital* or convert it into another type of *capital*. Thus, those who follow mathematics and charts commonly differ from followers of economic analysis by their lower amount of *capital*. However, they could also be contrasted according to the nature of their investments. Some, often from a slightly more "cultural" background and more likely to make a cultural and academic investment, express *cultural goodwill* (here scientific), and seek to extend their academic experience by holding positions in which mathematics is

required (structured products traders, financial engineers or R&D engineers). Others, who either come from a more working-class or lower-middle-class background, in other words from a more modest background, express *economic goodwill*, invest themselves academically only if their studies lead to a profitable position and seek the most profitable positions and techniques at work. Those from the wealthiest social background (in this case the sales people, although this is not necessarily the case in all banks) are the most predisposed to using economic analysis more than others. The opposition between traders and engineers on the one hand and sales (or users of economic analysis) on the other does not lie solely in the degree to which they make use of economic analysis. Traders, engineers, chartists and arbitrageurs, to some extent, all remain attached to the technique that enables them to be what they are, because of the cultural and legitimate value of mathematics for some and because of the "counter-cultural" value of charts for others. (Often, traders from the lowest social background, therefore with less knowledge of the legitimate hierarchies, take the most pride in their illegitimate techniques.) Sales people and "historical" traders today working as heads of room, from higher social backgrounds and with relatively lower capital, have more successfully internalised the requirements of economic domination. They see techniques as economic techniques alone, which they measure only according to their profitability. They use one technique or another indifferently provided that it works, but are able to maintain a kind of "axiologic neutrality". For this reason, they find it much easier than most to "leave the market", contradict the fundamental values of the market (dealings, volatility), and hang back in "juicier", more political positions such as head of desk or head of room.

At a time when the profession is trying, with difficulty, to establish a legitimate position for itself in society, everyday conflicts over hierarchy and legitimacy in the market and in dealing rooms reinforce the positioning that is already influenced by economic and cultural investments made before joining the market.

*Rationality, innovations and investments*

The jumbled, motley, colourful stalls of this bazaar of rationality are perplexing for anyone used to the orderly shelving of the rational action theory. However, much like those in Moroccan towns, this bazaar has its own coherence, organisation, and economy. The advantage of this diversity of forms of reasoning used in the financial world is that it presents us with a case in which the sociological theories of socialisation do not lead as usual, via different routes, to conclusions similar to those of the most rationalistic economic theories[38]. Such a case invites us to question economics.

Neo-classical economics thus makes a clear distinction between rationality – a decision-making process – and innovation – a transformation of the production process. Just as rational decision is clear and distinct, certain and flawless, optimal and systematic, so innovation is fragile, uncertain and its stochastic succession. This *homo economicus* is a curious individual with a limitless capacity to make the right decision but an extremely limited capacity to innovate properly. Could economics, too, not enrich its analysis of the decision-making process by considering individual rationality not as a timeless phenomenon but as a practice to be acquired, comprised of discoveries and innovations and requiring capital and investment?

[38] P. Bourdieu often highlights the fact that the theory of rational expectations leads, for the wrong reasons, to similar conclusions as the theory of habitus. As O. Favereau rightly pointed out in a speech given at the Paris Dauphine University seminar entitled "Sociology and Economics" on 17th October 2000, this criticism scarcely disturbs (and may even bolster) the most orthodox version of neo-classical theory, so attached to Friedmanian instrumentalism, for which the real process is of no importance as long as everything happens "as if".