LES CAHIERS

Louis Bachelier

IN THE HEAD OF INVESTORS AND SAVERS

With

Guy Kaplanski
Luc Arrondel
Hippolyte d'Albis
Milo Bianchi
Yannick Viossat

#14 Juny 2014

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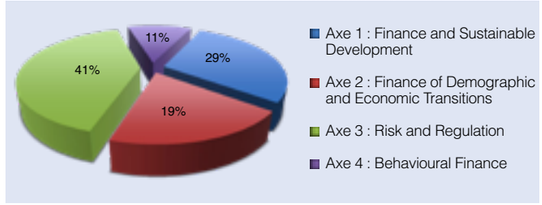

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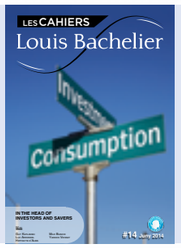
EDITO

Models in economics and other disciplines models are built on the basis of necessarily reductive hypotheses that are at same time sophisticated enough to give the model high explanatory and/or predictive power. The ideal model is parsimonious in terms of rules and parameters and rich in terms of conclusions that closely match observed reality.
It necessarily neglects certain phenomena deemed to be secondary and therefore explains observations in an unavoidably imperfect way: no model is perfect. Sometimes, however, by virtue of the model's elegance, simplicity and high predictive power, we come to think that it is the model which is perfect and the reality imperfect. So it is with the so-called ideal gas law in thermodynamics: it is not that the law imperfectly describes the behaviour of gases, rather it is the gas which becomes perfect when it obeys this law.
Similarly, standard economic models have instituted rationality on the basis of the supposed capacity of the individual to take into account all available information, to deduce from it all possible conclusions and thus infer expectations that may be modified over time but always remain mutually compatible. The individual is then supposed, on this basis, to coolly maximize a utility function or a gain by taking into account and assessing all future times and scenarios in accordance with his expectations. This paradigm has produced a large number of operational conclusions and insights that have made possible numerous advances, especially in finance and insurance. So much so that we have come to regard as irrational any individual or market whose behaviour or functioning does not conform to the hypotheses or predictions of the theory.
Behavioural finance takes the opposite approach: it sets out from the observed behaviours and characteristics noted in particular by psychologists and sociologists and incorporates these "biases" into the economic analysis.
The "Individuals facing risk: analysis and behaviour of markets" Chair of the Risk Foundation, supported by Groupama, adopts this approach and explores, on both an empirical and a theoretical basis, individual behaviour and how markets integrate it, reflect it and contribute to it.
This issue of Cahiers presents some of the work developed in this framework. While Guy Kaplanski and his co-authors are interested in the effect of emotions on decision-making and in particular on the financial behaviour, Luc Arrondel and André Masson analyse, on the basis of an extensive survey conducted between 2007 and 2011 , how the crisis has changed the financial behaviour of households. Hippolyte d'Albis and his co-authors focus on another factor that affects behaviour, namely longevity. What links may there be, they ask, between longevity and the retirement age? Yannick Viossat on the one hand and Milo Bianchi and Philippe Jehiel the other are interested in people's degree of sophistication, at a theoretical level for the former and at an operational level for the latter. The "rational" agent is assumed to be sophisticated in the sense that he perfectly identifies the relevance of information and takes into account all the actions – when he is able to observe or infer them – of other agents. In reality, people's behaviour is less sophisticated. But is their performance any the worse as a result? It is this question that Yannick Viossat addresses. Bianchi and Jehiel take a two-pronged approach, exploring the impact of investors' degree of sophistication on their "understanding" of companies' financial reports and ultimately on their assessment of the company. The way in which these reports are presented and written thus becomes a powerful tool for influencing analyses and evaluations.

Elyès Jouini



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Do happy people make optimistic investors?

The decision to buy or sell a stock is based on a set of economic facts and prospects related to the sector and the company. But do other factors come into play? Do non-economic events influence investment decisions? To what extent can emotions and feelings change financial behaviour? These are the issues addressed in this article.

Based on the paper "Do Happy People Make Optimistic Investors?" by Guy Kaplanski, Haim Levy, Chris Veld and Yulia Veld-Merkoulova.

In a perfectly rational world, decisions would be made solely on the basis of facts and figures. In reality, however, investors are human beings who are sometimes swayed by their feelings. The academic literature (Baker and Wurgler, 2007) defines investor sentiment as the set of beliefs about cash flows and future risks that are not justified by the facts. How do these feelings impact on investment plans?

Guy Kaplanski, Haim Levy, Chris Veld and Yulia Veld-Merkoulova have addressed this issue in order to find out the real effect of emotions on financial behaviour. They studied the relationship between external events often affecting morale (weather, sports results, etc.) and the general mood of the individual, as well as the relationship between these events and the expectations of the investor regarding volatility and the profitability of the market.

To do so, the authors questioned active investors in equity markets and explored the influence of five parameters:

- the person's general mood
- the weather
- seasonal depression
- the performance of their favourite sports team
- and the day of the week: for example, does the fact of it being the weekend alter expectations?

Mood effects people's view of the market

The findings of the survey confirm certain widely held ideas. The weather has a significant impact on overall mood: the more people find the weather to their liking, the higher their morale. Similarly, people suffering from seasonal affective disorder (SAD) are particularly downcast during the autumn and winter. So when one is in a bad mood, the more pessimistic one is, and vice versa. The returns expected by people who say they are feeling cheerful are systematically higher than those of people in a bad mood.

To analyse more precisely the impact of the person's well-being on his or her financial behaviour, the authors created an Individual Sentiment Index (ISI), which includes different emotional variables (namely the weather, SAD and sports scores). They show that the index has a positive effect on expectations of stock market returns and a negative impact on risk perception. In other words, if the investor is feeling good, he will have an optimistic view of the financial market, exaggerating the potential benefits and downplaying the risks. These findings are consistent with previous studies, notably those of Nygren, Isen, Taylor and Dulin (1996), who showed that positive emotions lead to greater optimism as to the probability of future gains.

> *"The happier investors are, the more they expect good performances in stock market"*

An investor who is optimistic is more likely to buy

The "happier" an investor is, the more optimistic his or her view of the markets. It remains to be seen whether this positive outlook is reflected in the facts, and thus in investment plans.

This is indeed the case. Having higher expectations of returns, investors are inclined to purchase more stock. On the other hand, the effect of expectations of risk on purchases or sales of stock is not very significant, suggesting that investors make their decisions primarily on the basis of their expectations of performance.

Furthermore, such feelings effect behaviour both in the domestic market and in foreign markets: the person's well-being positively affects his or her view of the Dutch stock market, as also that of the U.S. market. Similarly, the perception of returns is more optimistic, both in the short and longer term.

Finally, note that even if respondents say they are in a better mood on Saturdays, they nevertheless do not change their financial behaviour at the weekend. From this standpoint, the day of the week appears to be irrelevant.

Assets also linked to non-economic factors

Numerous laboratory experiments have shown that investors make decisions that are sometimes irrational or even in conflict with expected utility. The authors' study, based on a panel of active market investors, confirms the importance of emotions in investment decisions. The happier investors are, the more they expect strong performances and the less they foresee risk. Moreover, share prices are partly correlated to non-economic factors such as the weather, the time of year and sporting events.

While some of these findings were envisaged, the intensity of the phenomenon is nonetheless surprising. The expectations of people in a good mood are systematically higher than the other people's, and the difference is always significant.

Key points

- Investors' general mood affects their view of the financial market. They happier they are, the more optimistic they are regarding returns on investment.
- If they expect better performances, investor buy more shares. Thus the share price is partly related to non-economic factors, including investor sentiment.

Further reading...

- *Allais, M. "Le Comportement de l'Homme Rationnel Devant le Risque : Critique des Postulats et Axiomes de l'École Américaine." Econometrica, 21 (1953), 503–546.*
- *Kamstra, M. J., L. A. Kramer and M. D. Levi. "Winter Blues: A SAD Stock Market Cycle." The American Economic Review, 93 (2003), 324–343.*
- *Nygren, T. E., A. M. Isen, P. J. Taylor and J. Dulin. "The Influence of Positive Affect on the Decision Rule in Risk Situations: Focus on Outcome (and Especially Avoidance of Loss) Rather than Probability." Organizational Behavior and Human Decision Processes, 66 (1996), 59–72.*

Find the Guy Kaplanski's article on www.louisbachelier.org

Methodology

The study was based on a representative sample of the Dutch population. In October 2010, 7,428 people were interviewed about their investment portfolios. The research then focused on 929 individuals who owned shares. Three waves of questionnaires were sent to them in November 2010, February 2011 and June 2011. Every panel member reported his or her expectations regarding the potential returns and risks of the Dutch and American stock exchanges, for the coming month and for the coming year. Respondents were also asked about their general mood, how their favourite sports team was doing, and their perception of the weather. They also said whether they suffered from seasonal depression.

Recommendations

- Non-economic factors, such as weather, sports results and feelings of well-being have a real influence on investment decisions.
- It is important to assess their impact in order to better understand investors' behaviour.

Has the crisis increased risk aversion?

The French are investing less and less in the stock market, preferring safer investments like savings accounts. This trend has become more pronounced since the successive subprime and sovereign debt crises. Does this mean that the crisis is making investors more risk averse? And if not, how are these changes in financial behaviour to be explained? Luc and André Masson Arrondel have analysed these developments, using a large-scale survey carried out between 2007 and 2011.

Based on the paper "Mesurer les préférences des épargnants: comment et pourquoi (en temps de crise)?" by Luc Arrondel and André Masson, and on an interview with Luc Arrondel.

BIOGRAPHY

Luc Arrondel

Luc Arrondel is research director at the Centre National de Recherche Scientifique (CNRS) and a researcher at the Ecole d'Economie de Paris (PSE). He is also visiting professor at the Paris School of Economics and scientific consultant at the Bank of France.
An economist, his research focuses on theoretical and empirical aspects of individual savings behaviour. In particular his work concerns the accumulation, composition and transmission of household wealth, as well as the measurement of savers' preferences and expectations.
In addition to his role as expert for INSEE in designing and operating "Patrimoine" (Inheritance) surveys, for fifteen years he has been conducting (with André Masson) Pate surveys (PATrimoine et Préférences face au TEmps et au Risque – Inheritance and preferences with regard to time and risk).

Since the collapse of Lehman Brothers, the French have become more cautious in their investments. A series of surveys (Pater), conducted between 2007 and 2011, have measured changes in behaviour. The number of declared shareholders decreased by 40% between December 2008 and June 2012, whereas deposits in Livret A savings accounts rose by about 30%[1]. Households themselves say that they are more prudent. In response to the question "Would you say that since the financial crisis you have become more cautious, less cautious, or have not changed?", 48% of those questioned said they were more cautious in 2009. This proportion rose to 54% in 2011, even though these changes must be qualified according to the different social categories in the population. In view of these observations, it is tempting to conclude that the crisis is making individuals more risk-averse.

But is this conclusion perhaps rather premature? Might there not be other factors that account for these changes in attitude?
Drawing on five successive surveys, Luc Arrondel and André Masson have studied the impact of the crisis on the economic behaviour of the French. They have analysed the shift in savings over time and looked for factors explaining it.

Three key factors

Choices with regard to savings depend on three main types of factor. First, the "resources" available to the individual. This is clearly a matter of people's overall wealth, but also of their health capital, educational level, financial knowledge, etc.
Second, perception of the economic environment and expectations regarding the future. This category includes economic factors (changes in wages, the risk of unemployment, the value of future pensions, etc.), as well as expectations regarding health and life expectancy, or indeed those concerning changes in social security system.
Finally, the person's preferences with regard to risk and time. These factors refer to the degree of risk aversion and preference for the present (how an individual balances future well-being against present well-being). The investor's preferences affect the trade-off between consumption and savings.

A controversial measure of risk

One of the points regularly discussed in the academic literature is the measurement of risk aversion. Traditionally, studies assess this using quantitative criteria, such as Likert-type risk scales (on a scale of 0-10, the person self-assesses his or her willingness to take risks), or questions around choices of virtual financial investments. The scoring method used by Luc Arrondel and André Masson is different, in that it includes qualitative measures to draw a "psychological portrait" of the investor. By means of questions on different aspects of life (consumption, work, sport, etc.), the authors evaluate the preferences of respondents with regard to risk and time.

Identical preferences

The findings of the survey show that, for the majority of households, the resources available in 2011 were "still little affected" by the crisis. Falling income cannot therefore account for changes in financial behaviour. In which case, is the explanation to be found in greater antipathy to risk? Conventional measurement methods, which are often sensitive to the economic environment, suggest this is so, since they indicate an increase in risk aversion. But the scoring system developed by Luc Arrondel and André Masson suggests something very different. According to this tool, investors still have the same attitude towards risk. They are generally as risk-tolerant as they were before the crisis: "neither more nor less", the study indicates. As for time preference, that too is stable: the "liking" for savings has barely changed.

But more pessimistic expectations

What is new is that the perception of the future has altered. People have become much more pessimistic, especially since the sovereign debt crisis of 2011. They are revising their expectations downward: whereas the individuals questioned in 2007 were counting on an increase in income of 3%, in 2011 they expected it to remain unchanged. Similarly, the average expected return on the stock market fell from 5.6% in 2007 to 0% in 2011. More pessimistic with regard to the stock market, the French are distancing themselves from it…
Savers' greater caution regarding their financial investments is thus explained by their gloomier view of the economic environment, not by changing preferences toward risk. Why invest in shares if one is convinced that they will not earn anything? The rather bleak view of the economic situation is, in the authors' opinion, the primary cause of the rejection of risky products. It is therefore a matter of restoring a degree of optimism to the population. While it is very difficult to influence a person's degree of risk aversion, measures could be taken to safeguard the economic, fiscal and social environment.

1. *Source: Quarterly SoFia survey conducted by Tns-Sofres on 12,000 panel members (including those in the Pater surveys)*

Methodology

Initiated in 1998 by INSEE, the Pater survey (Heritage and preferences regarding time and risk) was revived by Luc Arrondel and André Masson in 2007: more than 3,600 households were questioned. As well as the information usually collected in personal asset surveys, Pater focuses on qualitative and subjective questions designed to measure individual preferences in terms of savings (risk aversion, preference for the present, altruism, etc.) and expectations regarding future resources. The individual's preferences are thus measured by an original method of scoring (Arrondel and Masson, 2014) from lottery-choices, as well as in terms of attitudes, opinions and behaviour in different areas of life (health, work, leisure, consumption, retirement, etc.).

Key points

- Since the 2008 crisis, the French have been much more cautious in their investments. They have abandoned the stock market in favour of the safety of savings accounts.
- People have not become more risk averse, however. On the other hand, they are more pessimistic.
- Anticipating lower returns on equities and stagnant incomes, households have changed their behaviour as a result.

Further reading...

- *Borghans, L. Duckworth, A. L. Heckman, J. J. and ter Weel, B. (2008). "The Economics and Psychology of Personality Traits", Journal of Human Resources, 43(4): 972-1059.*
- *Barsky, R.B., Kimball, M.S., Juster, F.T. and Shapiro, M.D. (1997), "Preference Parameters and Behavioral Heterogeneity: An Experimental Approach in the Health et Retirement Survey", Quarterly Journal of Economics, 112(2), p. 537-580.*
- *Dohmen T., Falk A., Huffman D., Sunde U., Schupp J. and Wagner G. (2011), "Individual Risk Attitudes: New Evidence from a Large, Representative, Experimentally, Validated Survey", Journal of the European Economic Association, 9(3), p. 522-550.*
- *Guiso, L. and Sodini, P., (2012). "Household Finance: An Emerging Field", CEPR Discussion Papers 8934, C.E.P.R. Discussion Papers.*

Recommendations

- The issue of channelling savings towards long-term investments is regularly brought up in political debate. The present study allows us to see which levers may be used to influence savers' choices.
- Although it is difficult to change people's degree of risk aversion, governments can act to safeguard the economic environment, and thus reassure investors.
- Ensuring the sustainability of the pension system and the stability of fiscal policy are measures that contribute to an optimistic view of the future.

Find the Luc Arrondel's article on www.louisbachelier.org

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Video

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Does living longer mean working longer?

With reform of pension systems being a key political issue, Hippolyte d'Albis's study examines the factors influencing the age of retirement. How does an individual make his or her decision? And on what basis? Does longer life expectancy necessarily entail raising the retirement age? The answer is complex and involves both demographic and economic analysis.

Based on the paper "Mortality transition and differential incentives for early retirement" by Hippolyte d'Albis, Sau-Him Paul Lau and Miguel Sánchez-Romero and on an interview with Hippolyte d'Albis.

Raising the retirement age is often presented as inevitable. "We're living longer, therefore, we need to work longer." Contemporary history, however, is at odds with this view.
In the course of the twentieth century, the retirement age declined in developed countries, while life expectancy increased. In the United States, for example, life expectancy at birth for a boy was 50 in 1900. It rose to 70 by mid-century, and reached 80 in the 1990s. In parallel, the employment rate of men aged 65 and older steadily decreased from 60% in 1900 to 20% in 1990. A state of affairs that may seem contradictory.
The study conducted by Hippolyte d'Albis and his co-authors attempts to explain this paradox. The researchers focus on the links between longevity and retirement age, and more generally consider the different motivations that influence this decision. Why do people choose to stop working? On what factors do they base their decision?

The authors identify three main elements:

- the prevailing public pension system, with its various incentives and penalties,
- the level of wealth,
- and life expectancy.

As a first step, they developed a model enabling them to assess theoretically the relative importance of these three factors on retirement age. They are currently further developing their study using empirical tests on U.S. data. Indeed, the American system is better suited for the analysis. It is simpler than its French counterpart and comprises fewer specific pension schemes.

Decrease in mortality: an impact that varies according to age

The first criterion evaluated is that of longevity. From a theoretical standpoint, increased lifespan has a twofold effect. On the one hand, the consumption horizon is extended. The individual therefore has an incentive to reduce spending at every age level and to work longer to compensate for the lengthening of his or her life. It calls for forward planning, and this tends to reduce consumption. On the other hand, in living longer, each individual will benefit longer from his or her income. Consequently, there is also a positive effect on wealth. The aim of the research is to determine which effect is dominant.
It emerges that the impact varies according to the age at which lower mortality comes into play. If the probability of survival improves at a young age, the income effect prevails. This creates a wealth effect because the extended lifetime applies to the person's working life. Conversely, if survival improves after retirement age, it has no effect on the income level. People thus have an incentive to extend their working lives in order to finance a longer retirement. The forward planning effect prevails.

> *"The increase in life expectancy has little impact on the timing of retirement"*

Between economics and demography

Through this demonstration, the paper makes the link between economic change and the epidemiological transition, also known as the health transition[1]. The beginning of the transition is basically marked by the decline in infant mortality; while over the years, gains in life expectancy are obtained for adult and then elderly populations.
The age of starting retirement will therefore tend to rise at the beginning of the health transition, and then to decline. Yet during the twentieth century, declining mortality affected both young and older populations.
In addition, according to the researchers, planning ahead and income effects cancel each other out. This hypothesis has been confirmed in relation to U.S. data. The factor of increasing life expectancy alone has a very small impact on the timing of retirement.

Less penalty, no more growth

With the longevity factor having "no effect", the researchers then looked at the influence of the public pension system. Using their model on U.S. data, they carried out a projection of the start of retirement with a system that has not altered since 1935. In other words, the system under consideration involves no penalties or incentives with regard to the duration of working life. This finding is rather surprising, in that the timing of retirement remains essentially unchanged. Bonus/malus systems, introduced by governments to encourage the active population to work longer, are therefore ineffective. However, the findings of the study do not concern the sustainability of the system. Although penalties have little impact on the decisions of people in work, they are useful from an economic standpoint.
Lastly, the analysis focuses on the correlation between retirement and growth. In particular, it examined the effects of zero growth, hence of a stagnation of incomes. This hypothesis was incorporated into the model. The study then shows an increase in the retirement age. In times of economic downturn, people work longer in order to compensate for their loss of income. These findings point to a lengthening of working life.

1. *Period of decline in mortality that accompanies the demographic transition. It is accompanied by an improvement in hygiene, food and the organization of health services and in changing causes of death. Source Ined.*

Biography

Hippolyte d'Albis

Hippolyte d'Albis is Professor of Economics at the University Paris 1 and at Paris School of Economics, and is a member of the Institut Universitaire de France and of the "Transitions économiques, transitions démographiques" and "Les particuliers face au risque" Chairs. After obtaining his PhD in December 2003, he was recruited to the University of Toulouse 1, where he remained until his appointment in Paris in September 2011. In 2012 he received the Best Young Economist Award by the Circle of Economists and Le Monde. His research focuses on the economic analysis of demographic phenomena such as population aging, fertility and immigration. This research is supported by the European Research Council (ERC starting grant).

Methodology

The study presented is based on the life-cycle hypothesis. The individual makes his choices in a rational manner. His decision to retire is based on a trade-off between consumption and savings. The researchers first developed a model representing this behaviour. They then tested its robustness using U.S. data. They found that 90% of the model's predictions were consistent with existing data, and the average forecast was close to the observed data. The model could then be used to make projections and to test the sensitivity of certain factors on retirement age.

Key points

- The impact of the decline in mortality on retirement age varies during the epidemiological transition.
- The reduction of working life observed during the twentieth century is consistent. It is not due to an ineffective pension system.
- The growth rate has a strong impact on retirement age. A period of economic prosperity allows retirement to be taken earlier. A recession, on the other hand, leads to people working for longer.

Further reading...

- *D. E. Bloom, D. Canning, R. K. Mansfield, M. Moore, Demographic change, social security systems, and savings, Journal of Monetary Economics 54 (2007), 92-114.*
- *D. L. Costa, The Evolution of Retirement, University of Chicago Press, Chicago, 1998.*
- *J. Gruber, D. A. Wise, Social security and retirement: An international comparison, American Economic Review Papers and Proceedings 88(2) (1998), 158-163.*

Find the Hippolyte d'Albis's article on www.louisbachelier.org

Recommendations

- It is essential to address the issue of retirement, by adopting an interdisciplinary approach.
- Demographic and economic structures are closely related, even though demographic changes do not always entail linear economic change.
- It would be interesting to conduct a similar study using French data.

It is not in companies' interest to communicate transparently

Every investor relies on information provided by a company to estimate its value. However, because his or her resources in terms of time and capital are limited, the analysis may be biased. In this context, is there an incentive for companies to complicate their financial reports so as to influence investors' beliefs? What are the consequences in terms of stock prices?

Based on an interview with Milo Bianchi and on the paper "Financial reporting and market efficiency with extrapolative investors" by Milo Bianchi and Philippe Jehiel.

Listed companies have to comply with various rules, especially with regard to the transmission of information to the market. Thus they are required to prepare an annual financial report pertaining to their business. Companies do, however, benefit from a certain freedom in the presentation of this document. They may give greater or lesser detail, divide up the content into numerous subsections or provide a relatively concise summary.

In their study, the authors examine the impact of the financial reporting strategy on investors. Does it have an influence their behaviour? By extension, can financial communication affect stock prices? Are more sophisticated investors less sensitive than others to these marketing methods?

A question of time…

To implement their transactions, investors assess the value of a company based on the information provided. If the share price is lower than their estimate, they buy its shares; if it is higher, they sell. But this estimation is not done in a perfectly rational way. In fact it is biased at two levels. First, it is implemented under a time constraint. Thus faced with a dense and complex document, investors do not carefully examine all the information provided. Each investor focuses on selected information, which may vary from one individual to another. Research shows that investors are more responsive to good news. They look for the most profitable deals, and are inclined to allocate their capital to the most successful companies. Positive information thus has a greater impact on their behaviour, and hence on the share price, than negative information. Given this situation, lengthy and opaque reporting of financial results can "mask" poor performance. Although negative information is included, it receives less attention from investors.

BIOGRAPHY

Milo Bianchi

Milo Bianchi is a senior lecturer at the Toulouse School of Economics (TSE) and a member of the Institut d'Économie Industrielle (IDEI). His research focusses on financial economics, behavioural economics and corporate finance. The holder of an economics doctorate from the Stockholm School of Economics, he is also a graduate of the Massachusetts Institute of Technology, University College London and Bocconi University.

Methodology

The study is based on general equilibrium theory, which deals with investment decisions and pricing. It also draws on game theory. The authors consider a market composed of X companies. They make the assumption that each investor can buy or sell only one share. The investor therefore chooses the security he expects to be the most profitable. Since he does not know the fundamental value of companies, he assesses it by means of information provided in the financial report. With their model, Milo Bianchi and Philippe Jehiel measure the impact of the financial communication strategy on the assessment made by investors.

…and money

The second constraint is financial. Since investors have limited capital, they cannot invest in every company. They choose those that provide them with the best transaction advantage. Consequently, a firm's share price is not determined by all investors, but only by those who have staked their money on it – a situation that favours companies. This twofold limitation of resources – in time and in money – has a positive impact on company valuations. Share prices are pushed upward, sometimes well above their fundamental value.

> *"Complex presentation of financial results allows poor performance to be concealed"*

Faced with these market imperfections, the authors wanted to assess the impact of investors' level of sophistication in their approach to the financial report and their evaluation of the company. The level of sophistication is measured here by the amount of information processed. The study emphasizes that the more information investors process, the closer their evaluation of the company is to its real value. However, although investor sophistication improves the precision of the price formation process, and thus the functioning of the market, it is not enough to ensure its efficiency. Indeed the valuation made by investors remains higher than the fundamental value.

Competition is not everything

The researchers also examined the effects of competition. Does increased competition lead to a more accurate assessment of share prices? While free-market theory claims it does, the paper under discussion tends to show otherwise. However many there may be in the market, companies have no incentive to communicate transparently. Transparency results in the share price being set at its fundamental value, whereas a more opaque financial report leads investors to overvalue the company. So it is not in companies' interest to communicate clearly and accurately. The degree of competition in no way changes this state of affairs. It cannot, by itself, ensure proper price formation.

Efficient markets theory assumes that market actors are perfectly rational. The paper presented shows that reality is very different. Investors have limited time and capital for implementing their operations. Under such conditions, their analysis is biased. Companies are aware of this and deliberately opt for a complex presentation of their results to hide poor performance. The financial communication strategy used – straightforward and focussed on essential information or, conversely, dense and complex – has a direct influence on the share price.

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Key points

- The financial communication strategy chosen by firms has a significant impact on investor behaviour. A complex and opaque financial report can upwardly influence the share price by "masking" poor performance.
- Since investors have limited time and capital, they do not examine all the information, but focus on the positive points.
- Competition is not sufficient to remedy this market imperfection.

Further reading…

- *Hirshleifer, D. and Teoh, S. H. (2003), "Limited attention, information disclosure, and financial reporting", Journal of Accounting and Economics 36(1-3), 337-386.*
- *Scheinkman, J. A. and Xiong, W. (2004), "Heterogeneous beliefs, speculation and trading in financial markets", in R. A. Carmona, E. Çinlar, I. Ekeland, E. Jouini, J. A. Scheinkman and N. Touzi, eds, "Paris-Princeton Lectures on Mathematical Finance 2003", Springer Berlin / Heidelberg, pp. 223-233.*
- *Hong, H. and Stein, J. C. (2007), "Disagreement and the stock market", Journal of Economic Perspectives 21(2), 109–128.*
- *Tversky, A. and Kahneman, D. (1971), "Belief in the law of small numbers", Psychological Bulletin 76(2), 105 –110.*

Recommendations

- The assessment by investors of the value of a company is a complex issue. Many factors come into play.
- Increased vigilance by investors with regard to financial reporting would obviously be beneficial.
- It is also possible to increase the reporting constraints on companies. But the question of financial communication is also related to the executive compensation policy.
- Other studies have shown that the greater the financial stake of managers in the company's performance, the greater their incentive to manipulate prices.

Game theory: does simplicity lead to complexity?

There are a number of contrasting approaches in game theory. One difference between the models concerns the sophistication of the players and their level of understanding of the game: some will think in complex ways taking into account the actions of other participants, while others will adopt more naive behaviour. But ultimately, is the performance of sophisticated players really better? In this study, Yannick Viossat addresses these issues indirectly by linking two simple learning processes: fictitious play and no-regret dynamics. By means of this link, understanding one of these processes enables the other to be better understood as well.

Based on the paper "No-regret dynamics and fictitious play" by Andriy Zapechelnyuk and Yannick Viossat and on an interview with Yannick Viossat.

BIOGRAPHY

Yannick Viossat

Yannick Viossat is Assistant Professor in mathematics at Université Paris-Dauphine. Before joining Dauphine, he did his Master and his Ph.D. at Ecole polytechnique, and a post-doc at Stockholm School of Economics. He is a member of the CEREMADE, Paris-Dauphine's Center for Mathematics Applied to Decision Sciences.
His research focuses on Game Theory - the formal study of interactive decision making - and its applications to economics, finance and biology. He is mostly interested by models of evolution and learning, in particular the evolution of behaviour of boundedly rational agents who adapt to their environment through rules of thumb. His work is published in journals of mathematics, economics, finance, and theoretical biology.

Various economic and financial theories seek to understand and anticipate the behaviour of financial agents. Game theory is one of them. It analyses the decision-making of individuals, businesses and institutions, in situations of interaction. Each player has his own interests and may position himself in different ways. The best strategy depends on the actions of other players. Given the behaviour of others, there are one or more right decisions, but there is no right decision in itself. Each participant also tries to predict the behaviour of his fellow players. The question then is what level of knowledge does each player of the game have.

Simple players or complex players

Here there are a number of theoretical approaches, corresponding to different characteristics of players. Some view players as perfectly rational and very well informed agents. Players have an excellent understanding of the interaction in which they are engaged and take account of other players' interests. These are strong assumptions and do not always correspond to reality.
Other models consider less sophisticated players. Agents make decisions without fully understanding the interaction in which they participate. They use simple strategies, for example imitating other players who have obtained good results in the past or using a trial and error approach.
One key question is to understand the differences and similarities between these two types of players. In the long run, do "simple" players manage to come close to the performance of "sophisticated" players? Do they learn from their mistakes? Does their suboptimal behaviour eventually improve in the course of playing? What are the links between the actions of these two types of players? How do we explain any possible correlations? This question is central to the work of Yannick Viossat. He addresses it an indirect manner. The study establishes links between two learning processes: two separate ways of behaving. When one knows that the first results in sophisticated behaviour, one can then say the same for the second, at least in certain types of game.

From fictitious play...

The author examines two learning processes: fictitious play and no-regret dynamics. In the first, each agent assumes that the past is a good indicator of the future. He bases his play on the average past behaviour of other players so as to anticipate their future moves. More specifically, at time t+1, he chooses an action that is optimal in view of the average behaviour of other players up to and including time t. "It involves a somewhat naive learning process, since it does not take into account changes in the behaviour of other players," Yannick Viossat says.

… to no-regret dynamics

The second process (in fact, a class of processes) is linked to the idea of regret. In a repeated game, a player regrets not taking an action if he thinks in retrospect that it would have given him more advantages than those he did choose. "The feeling of regret is not necessarily rational," the researcher points out, "because if player A alters his behaviour, it is likely that player B does so does too. If player A had in the past taken the action he regrets not having chosen more often, it might have resulted in player B behaving in a way that was much more harmful to A. Nevertheless, it's a feeling which we experience and which influences our decisions."
A no-regret dynamic chooses an action with a probability that is all the higher since one regrets not having chosen it in the past. It ensures that the player has no regrets in the long term. Even though it does not guarantee winning every time, it does so on balance: no other consistent behaviour (i.e. repeated in every game) is able to give better results.

Two strategies: the same performance

In his paper, Yannick Viossat shows that a large class of no-regret dynamics and fictitious play are closely related, the first corresponding to a process of perturbed fictitious play. In the long term, fictitious play and no-regret dynamics give similar results. Previous studies had found similarities in the outcomes obtained from these two learning process, but failed to explain them. The link between the two strategies has now been made clear, thanks to recent mathematical results in a certain class of perturbed dynamical systems. It serves firstly to understand the closeness of the results, and secondly it allows one process to be analysed through the other. Thus it will be possible to understand the functioning of no-regret dynamics through knowledge of fictitious games. Knowing that in some types of games fictitious play leads to sophisticated behaviour, such as deploying Nash equilibria – a situation where everyone plays optimally given the behaviour of others –, it is likely that no-regret dynamics will have similar properties. The authors were able to establish this in certain classes of games, thereby providing a further way of improving knowledge and understanding of the behaviour of financial agents.

Methodology

To link the processes of fictitious play and no-regret dynamics, Yannick Viossat and Andriy Zapechelnyuk make use of the theory of perturbed differential inclusions, recently developed by Michel Benaïm, Josef Hofbauer and Sylvain Sorin. They show that no-regret dynamics can be seen as perturbed versions of a continuous time version of the fictitious play process. The above-mentioned theory is then used to show that the limit sets of solutions to no-regret dynamics have the same basic properties as the limit sets of solutions to the fictitious play process. The connection is nevertheless subtle and does not imply that these processes behave in exactly the same way in the long term in every game. That calls for additional conditions, but it has been established in certain classes of games.

Key points

- No-regret dynamics and fictitious play are two simple learning processes.
- Players are relatively unsophisticated and are not fully aware of the interactions among the different participants.
- These two learning processes work very similarly: no-regret dynamics is actually an instance of perturbed fictitious play. Given that, in some cases, fictitious play leads to sophisticated behaviour in the long term, the same may be deduced for no-regret dynamics.

Further reading...

- *M. Benaïm, J. Hofbauer and S. Sorin. "Stochastic approximations and differential inclusions. Part II: Applications", Mathematics of Operation Research 31 (2006), 673-695*
- *N. Cesa-Bianchi and G. Lugosi, "Prediction, Learning, and Games", Cambridge University Press, 2006*
- *S. Hart and A. Mas-Colell, "Simple Adaptive Strategies", World Scientific Publishing, 2013*
- *W. H. Sandholm, "Population Games and Evolutionary Dynamics", MIT Press, 2010*

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Recommendations

- The study of learning phenomena in game theory can be applied to the management of complex networks, such as telecommunications networks. It may, for example, be used to ensure that mobile phones select a base station that gives optimal network functioning.
- In the field of finance, game theory can offer a qualitative approach to investor behaviour.

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