

Economics, Finance and Management is the seventh category to be decided

Paul Milgrom wins the BBVA Foundation Frontiers of Knowledge Award for his contributions to auction theory and industrial organization

- The jury singled out Milgrom's work on auction design, which has been taken up with great success by governments and corporations
- He has also contributed novel insights in industrial organization, with applications in pricing and advertising

Madrid, February 19, 2013.- The BBVA Foundation Frontiers of Knowledge Award in the Economics, Finance and Management category goes in this fifth edition to U.S. mathematician Paul Milgrom "for his seminal contributions to an unusually wide range of fields of economics including auctions, market design, contracts and incentives, industrial economics, economics of organizations, finance, and game theory," in the words of the prize jury. This breadth of vision encompasses a business focus that has led him to apply his theories in advisory work with governments and corporations.

Milgrom (Detroit, 1942), a professor of economics at Stanford University, was nominated for the award by Zvika Neeman, Head of The Eitan Berglas School of Economics at Tel Aviv University.

"His work on auction theory is probably his best known," the citation continues. "He has explored issues of design, bidding and outcomes for auctions with different rules. He designed auctions for multiple complementary items, with an eye towards practical applications such as frequency spectrum auctions."

Milgrom made the leap from games theory to the realities of the market in the mid 1990s. He was doing consultancy work for Pacific Bell in California to plan its participation in an auction called by the U.S. Federal Communications

Commission, and was able to pinpoint errors in the auction design that produced a worse outcome for both organizers and bidders. He and Robert Wilson proposed an alternative method which the FCC agreed to try out. Their innovation, known as the simultaneous multiple round auction (SMR), replaced the traditional sealed envelope with an open bidding format, in which each company could observe what the rest were offering, supplemented by rules to prevent monopoly pricing. The auction – of electromagnetic spectrum for what was then the new generation of cell phones, pagers, and other wireless communication devices – raised the record sum of over seven billion dollars, and testified in the most practical way possible to the value of games theory in strategic decision-making.

SMR has since been used by governments the world over to auction not only airwaves but also natural gas, electrical power, etc.

Shortly after being informed of the Frontiers of Knowledge Award, Milgrom explained how this contribution came about: “I started out studying mathematics, but then moved to Stanford to study business and discovered the work of William Vickrey, who went on to win a Nobel prize for his work on auction theory. I was fascinated by this kind of mathematical approach to human behavior, and decided that was what I wanted to explore.”

Asked what makes the auction such an important mechanism, he replies: **“Auctions determine how resources are shared out, they decide who gets what and at what price, at times even a lot of goods being offered simultaneously.** They are important for the same reason that markets are important. Initially, no one can know what a given object is worth to each of its possible buyers, and we need a mechanism that gives us that information; **a competition so buyers can show their interest through bidding and the resources go to the highest bidder, but also so resources end up on the hands of those who will put them to good use.”**

Milgrom developed SMR to make this competitive process more efficient, as well as adaptable to non-price bidding mechanisms such as placing students into college courses, or reallocating airline slots in the event of bad weather at a crowded airport.

Auctionomics, the firm he created as an outlet for his research findings, has been engaged by regulators in the United States, United Kingdom, Canada, Australia, Germany and Mexico to advise on the design of auctions in strategic sectors.

This advisory role extends to both the organizers of auctions and those wishing to bid: “We help auction organizers to design them better. Normally the big challenge is to attract bidders. The auction has to be simple and easy to understand, but at the same time respect the complexities inherent to each situation, including technical and other constraints. If the client is a buyer, we help them understand the rules of the auction and think ahead to how much money they might need, what they can hope to get at what price, and what they can expect from competitors.” The technical guidance the firm provided to Comcast

in a radio spectrum auction saved this client nearly \$1.2 billion on its license purchases based on the prices paid by other large bidders.

Milgrom's company is currently advising FCC on the incentive auction through which the Commission plans to reallocate part of the spectrum used for TV broadcasting to telephone operators, in an operation likely to be worth around 55 billion dollars.

Industrial organization

The jury also refers to another of the new laureate's lines of work: "Professor Milgrom's research in industrial organization includes influential studies on limit pricing, entry deterrence, predation, and advertising."

Best known perhaps are his reflections on the complementarities between a company's strategy and organizational design, and on the design of incentives for workers in multitask jobs.

His theoretical insights in this field were brought together in the 1992 publication *Economics, Organization and Management*, co-authored with John Roberts and now a standard textbook in schools of economics throughout the world.

"When I teach my students theory, I encourage them to challenge me by asking me how it is useful. It's healthy for them to ask, and it's not hard for me to answer because I always have real-world examples in mind when I am working on my theories," Milgrom observes.

And here too his ideas have found a home in the corporate sector, where he has advised Google on its IPO auction of shares, Yahoo! on the design of an advertising market and Microsoft Networks on sponsored search auctions.

Talking about the Google launch, Milgrom explains: "When companies are preparing an initial public offering, they think about investment banks and other strategies, they never think about it as an auction. Google wanted to do things differently. They wanted to design an auction that was inviting for clients who were not versed in financial markets, and also to know the risks involved."

"In addition, Milgrom has added important novel insights to finance, particularly in connection to speculative trading and market micro-structure. The common theme of his works on auctions, industrial strategies, and financial markets is that economic actors infer from prices and other observables information about the fundamental market values," according to the award certificate.

The jury also highlighted the laureate's contribution to agency theory "by describing conditions under which linear incentives are optimal, and by developing a tractable mode of multitask agency relationships. His work in contract and organization theory has been very influential in management science." Finally, it concluded, "Professor Milgrom has contributed to

mathematical economics and game theory, with studies on reputation and adaptive learning."

Bio notes

Paul Milgrom (Detroit, Michigan, 1948) completed a BA in mathematics at the University of Michigan, before moving to Stanford, where he specialized in statistics and earned a PhD in business. He began his research and teaching career at Northwestern University (Illinois), where he would later occupy a series of professorial posts. In 1987, after five years at Yale, he returned to Stanford University, where he is currently the Shirley and Leonard Ely Professor of Humanities and Sciences, as well as professor by courtesy in the Stanford Graduate School of Business.

His scientific papers and books have been cited more than 53,000 times, according to Google Scholar. He had occupied editorial positions at international journals including *American Economic Review*, *Econometrica* and *Journal of Economic Theory*, and is a fellow of the Econometric Society and a member of both the U.S. National Academy of Sciences and the American Academy of Arts and Sciences.

BBVA Foundation Frontiers of Knowledge Awards

The BBVA Foundation primarily engages in the generation and diffusion of scientific knowledge and culture, through ongoing programs in the areas of basic sciences, biomedicine, ecology and conservation biology, social sciences, literary and musical creation, and the visual arts.

Its focus on the core concerns of today's society, like health or the environment, has materialized in major research projects, including those involving the study of cancer. The Foundation's support for research, advanced training and knowledge dissemination is also manifest in a series of award families which not only honor the winners' contributions but also shed a wider light on their fields of work, the values they represent and the combined endeavors of the research and creative communities.

The BBVA Foundation established its Frontiers of Knowledge Awards in 2008 to recognize the authors of outstanding contributions and radical advances in a broad range of scientific and technological areas characteristic of our times. They are in this sense a prize family congruent with the knowledge map and central challenges of the 21st century.

The nominations received from leading universities and research and cultural centers all round the world, the independence and objectivity of the prize juries formed by reputed specialists in their respective fields, and the excellence of the laureates in their earlier editions have earned these awards, devised and organized from Spain, a firm place among the world's foremost award schemes. The BBVA Foundation is assisted in this initiative by the country's premier

multidisciplinary research organization, the Spanish National Research Council (CSIC), and by the presence of Spanish scientists and creative practitioners on the international juries.

The CSIC collaborates in the appointment of Technical Evaluation Committees for each prize category made up of acknowledged experts in the relevant domain. This Committee undertakes an initial assessment of candidates and draws up a reasoned shortlist for the consideration of the juries.

In the Economics, Finance and Management category, Committee members were Luis Sanz Menéndez, Research Professor in the Institute of Public Goods and Policies (CSIC); Cristina de la Puente González, Research Scientist in the Institute of Languages and Cultures of the Mediterranean and the Middle East (CSIC); and Albert Marceŧ, Research Professor in the Institute for Economic Analysis (CSIC).

The Frontiers awards provide an international showcase for the best qualities of Spain and Spanish science, and have achieved the endorsement of the world scientific community, whose members have served on the juries and put forward nominations from their posts in eminent Spanish and international academic and research institutions.

In their fifth edition, the BBVA Foundation Frontiers of Knowledge Awards wish to offer support and recognition to the individuals and teams working for a better future for people through the advancement of knowledge, innovation and culture and their dissemination to society; goals and practices that are also at the center of the BBVA Group culture.

In an economic context marked by a prolonged economic crisis and the adoption of short-term measures to tackle its multiple causes and manifestations, science, the environment and culture have dropped further down the list of public priorities. The BBVA Foundation Frontiers of Knowledge Awards, and the Foundation's broader program to foster scientific knowledge and culture, wish to drive home the message that these three areas are of transcendental importance for our collective wellbeing and individual opportunities.

The eight categories of the BBVA Foundation Frontiers of Knowledge Awards, each carrying prize money of 400,000 euros, respond to the knowledge map of the early 21st century, but also to key global challenges that have never before merited a specific honor on this scale, as with the two environmental categories – Ecology and Conservation Biology and Climate Change – and the category of Development Cooperation. These stand alongside the classic categories of Basic Sciences, Biomedicine and Economics, Finance and Management. Finally, the award family is completed by Contemporary Music, an art at the leading edge of cultural innovation to which the BBVA Foundation devotes a broad-ranging support program, and where Spain is home to a wide and talented community of authors, conductors and performers.

International jury

The jury in this category was chaired by **Kenneth J. Arrow**, Nobel laureate in Economics and Professor of Economics and of Management Science and Engineering, Emeritus, at Stanford University (United States), with **José Manuel González-Páramo**, Visiting Professor at IESE Business School (Spain), acting as secretary. Remaining members were **Andreu Mas-Colell**, Professor of Economics at Pompeu Fabra University (Spain); **Joel Mokyr**, Robert H. Strotz Professor of Arts and Sciences and Professor of Economics at Northwestern University (United States); **Albrecht Ritschl**, Professor of Economic History at the London School of Economics (United Kingdom); and **Jean Tirole**, Chairman of the Board of the Fondation Jean-Jacques Laffont at Toulouse School of Economics (TSE) and Scientific Director of Toulouse University's Institute for Industrial Economics (France).

The jury's deliberations take place behind closed doors in the BBVA Foundation's Madrid headquarters, with the winner announced to the media the following day.

Last year's winner in this category was **Angus Deaton** "for his fundamental contributions to the theory of consumption, savings and the measurement of economic wellbeing," in the words of the award citation. The award in the third edition went to **Lars Peter Hansen** "for devising a statistical framework founded on economic science."

In the second edition, the award was shared by **Hugo Sonnenschein** and **Andres Mas-Colell** "for extending the reach and applicability of general equilibrium analysis and for establishing the modern theory of aggregate demand." Finally, the winner in the inaugural edition was **Jean Tirole**, "for his economic analysis of optimal contracts and optimal design of public policies in a variety of contexts where asymmetry of information and conflicting incentives play a key role, including regulation, corporate finance and the analysis of economic organizations."

UPCOMING AWARD ANNOUNCEMENTS

| CATEGORY | DATE |
|-------------------------|-------------------|
| Development Cooperation | February 26, 2013 |

LAUREATE'S FIRST DECLARATIONS AND IMAGES

A video recording of the new laureate's first interview on receiving news of the award is available from the Atlas FTP with the following name and coordinates.

Server: **213.0.38.61**
Username: **agenciaatlas1**
Password: **amapola**

The name of the video is:
"FBBVA PREMIO ECONOMÍA"

In the event of connection difficulties, please contact Alejandro Martín at ATLAS:

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Fundación **BBVA**

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