



Toulouse
School of
Economics

SCOR
FOUNDATION FOR SCIENCE

TSE – SCOR Foundation for Science Journal

Risk Markets and Value Creation Chair

May 2025



**How will genetic
tests impact health
insurance?**

**When should firms
adopt new technology?**

Economics for the Common Good

Research highlights

How will genetic tests impact health insurance? *page 5*

When should firms adopt new technology? *page 8*

Scientific events

Science in the spirit of Denis Kessler *page 12*

Workshop on Machine Learning Methods for Econometrics *page 14*

Scientific contributions

Working papers *page 16*

Articles in peer-reviewed journals *page 16*

Technological horizons and a tribute to a remarkable TSE supporter



Stéphane Villeneuve
Scientific Director, SCOR-TSE partnership

Dear readers,

In a world marked by uncertainty, rapid technological shifts, and mounting systemic risks, the SCOR-TSE Chair seeks to light the way ahead with cutting-edge research at the frontier of economics, risk analysis, and public policy.

This issue highlights two important publications supported by the Chair. David Bardey and Philippe De Donder examine how genetic testing could reshape health insurance markets, warning of new inequalities if regulation fails to keep up. Meanwhile, Jean-Paul Décamps, Fabien Gensbittel, and Thomas Mariotti explore the strategic dilemma firms face when deciding whether to invest in current technologies or wait for future breakthroughs.

We also reflect on two recent events that exemplify our dedication to providing a bridge between academic expertise and real-world experience and application.

In March, the SCOR Foundation for Science and TSE co-hosted a scientific conference in tribute to Denis Kessler's unwavering belief in academic freedom and the societal impact of scientific inquiry. This remarkable gathering brought together leading economists to discuss themes that were central to his intellectual legacy and continue to shape the future of insurance and economic policy.

Earlier in January, the TSE-SCOR Workshop on Machine Learning in Econometrics brought together top researchers to discuss how data-driven methods are transforming economic modeling, with applications ranging from cyber risk to portfolio management.

We hope this issue offers valuable insights and inspiration to keep Denis Kessler's flame alive..



Research highlights

How will genetic tests impact health insurance?

Genetic tests promise a new age of personalized healthcare, with targeted prevention therapies based on each patient's individual characteristics. However, DNA-based screening may also lead to dystopian inequalities that leave the most vulnerable with crippling premiums and paltry coverage. In new research backed by SCOR's Risk Markets and Value Creation Chair, TSE economists David Bardey and Philippe De Donder reveal how personalized medicine threatens to undermine our health insurance systems.



David Bardey is a TSE Associate and Professor at Universidad de Los Andes, Bogotá, Colombia. His fields of interest include economics of health, education and insurance, industrial organization, segregation, contract theory, labor economics, and operational research.



Philippe De Donder is a Research Director at the National Center for Scientific Research (CNRS) and a senior researcher at TSE. His research focuses on public economics, political economy, health economics and economics of regulation.

What are the concerns about the impact of genetic tests?

Genetic tests do not yet provide much useful guidance for disease prevention so their impact has been limited. A notable exception is the recommendation for women testing positive to the BRCA1 or BRCA2 alleles, which increase the probability of breast cancer, to undertake a mastectomy. In the near future, genetic tests are likely to enter much more widespread use as they become cheaper and more effective in providing actionable information for tailored prevention strategies.

At first glance, genetic testing seems like a great tool for individuals and society, as it helps people understand their health risks and take more efficient, preventive measures. However, our study warns of the impact on health insurance markets. Very few people currently take genetic tests so insurance companies tend to pool all policyholders into the same contract, regardless of whether they have had a genetic test.. However, as testing becomes more common, insurers may start differentiating between those with good results and those at higher risk.

If people who test positive for genetic risks are able to hide this information, this creates an issue known as adverse selection. Meanwhile, people who receive favorable test results will have a strong incentive to reveal them, encouraging insurers to adopt separating contracts that threaten fairness principles by jacking up premiums for uninformed and high-risk individuals. People with good genetic news will get cheaper policies at the cost of discrimination against those who need insurance the most.

Why is it so difficult for regulators to address these fairness concerns?

Contracts are often beset by such problems when their parties do not share the same information. We study a context in which people may choose to disclose information to private insurers about whether they have taken a genetic test, as well as its results. This corresponds to the consent law currently used in the Netherlands and Switzerland. While this simple setting limits the applicability of our analysis, it is important to note that similar mechanisms are at work under other forms of regulation.

Genetic testing helps people understand their health risks and take more efficient, preventive measures. However, our study warns of the impact on health insurance markets

Strict prohibition of the use of genetic information in underwriting and rating is also problematic since insurers can still offer a menu of contracts to allow informed policyholders to self-select. People who know that they are low risk through their genetic test results would choose the cheapest contracts with a lower level of coverage. A disclosure duty that obliges applicants to reveal test information is difficult to enforce given that a genetic test can easily be kept private by mailing a biological sample abroad and retrieving the results online.



**Policymakers
must pay attention
to the type of contracts
offered in health
insurance markets to
determine the desirability
of attempting to increase
adoption of genetic tests**

In contrast, our paper assumes that policyholders' prevention efforts are observable by insurers. This is because moral hazard – the reduction of preventive action due to health insurance coverage – does not appear to be a first-order problem in health insurance. Indeed, insurers are finding new ways to make healthy behaviors more accountable such as by observing weight loss, or using blood tests and wearable devices to assess physical activity, diet and drug use.

How does your research contribute to the debate about genetic tests?

We use our model to study how insurance contracts will be affected as genetic tests become more popular and more effective. For instance, in the case of a positive test for BRCA1/2, we must hope that the need for radical surgery will soon be replaced by less psychologically costly treatment.

Our first main message is that the impact may be detrimental to individuals and society, especially in the short run as insurers abandon pooling in favor of discriminatory contracts. The shift to separating contracts will be especially detrimental for high-risk policyholders. It is only in the longer run that further advances in genetic testing will start to improve individual outcomes and social welfare.

The second message is that the development of genetic tests is more likely to be beneficial – both for aggregate welfare and for those identified as high-risk – when widespread adoption of tests combines with major improvements in their effectiveness to induce insurers to revert to pooling contracts.



What important lessons emerge for policymakers?

Our findings that welfare is not perfectly aligned with the take-up rate of genetic tests imply that policymakers must pay attention to the type of contracts offered in health insurance markets to determine the desirability of attempting to increase adoption. In particular, as long as uninformed and high-risk policyholders remain pooled together within health insurance contracts, small increases in take-up rates should be discouraged.

However, once insurers switch to separating contracts, policymakers should begin adopting measures to increase the use of genetic tests. Policies that reduce the costs of prevention efforts or improve their effectiveness – such as subsidies for medical research – would be particularly beneficial in the long run.

KEY TAKEAWAYS

- Genetic tests can erode insurance – If insurers can distinguish between high-risk and low-risk individuals, premiums may rise for those most in need of coverage.
- Pooling vs separating – Genetic tests are likely to impact not only the pricing but also the type of health insurance contracts.
- Regulators must tread carefully – While insurers stick to pooling contracts, policies that promote genetic tests may not be advisable in the short term.
- Releasing the brake – Once separating contracts become widespread, R&D subsidies and other policies should be used to boost the take-up and effectiveness of genetic tests.

FURTHER READING

'A Welfare Analysis of Genetic Testing in Health Insurance Markets with Adverse Selection and Prevention' by David Bardey and Philippe De Donder. Other publications by these researchers are available to read on the [TSE website](#).

When should firms adopt new technology?

In today's high-speed digital economy, firms that fail to innovate can be quickly left behind. But what if delay is the best strategy? A new TSE study by Jean-Paul Décamps, Fabien Gentsbittel, and Thomas Mariotti, supported by the SCOR Risk Markets and Value Creation Chair, explores how firms decide whether to invest in what works today or wait for a breakthrough that renders current options obsolete. Highlighting the importance of the ebb and flow of market conditions, its results suggest policymakers will struggle to promote existing solutions when firms consider patience to be a more valuable asset.



Jean-Paul Décamps is a Professor of Mathematics at Toulouse School of Economics. His research focuses on financial economics, dynamic contracting, and stochastic control.



Fabien Gentsbittel is an assistant Professor in Applied Mathematics at Toulouse School of Economics. His research focuses on game theory.



Thomas Mariotti is a Researcher at Toulouse School of Economics and a Senior Researcher at CNRS. His work focuses on the theory of markets and contracts.

Why do firms avoid investing in available tech, even when it seems profitable?

The key issue is uncertainty. Companies don't just evaluate whether a technology is profitable today, they also consider whether something better might emerge tomorrow. If firms believe a major technological breakthrough is around the corner, they may hold off investing to avoid the risk of becoming locked into an outdated technology.

This dilemma is likely to have slowed the spread of technologies such as the steam engine, oxygen steel-making and solar panels through the global economy. Similarly, some car manufacturers have been reluctant to invest heavily in hybrid technology in expectation of the advent of fully electric vehicles.

Hesitation also brings risks. If a company waits too long, it could be outstripped by competitors who adopt existing solutions. In economic terms, this is an optimal stopping problem – firms must get the timing of their investment right, balancing current profitability against the potential of future breakthroughs.

Why is it important to consider market conditions?

Groundbreaking technologies – in carbon capture, for example, or AI and robotics – may be kept on ice if more advanced solutions are on the horizon. But firms may also delay investing if they are gloomy about the prospects for sustained demand or more favorable and transparent regulation.



Groundbreaking technologies may be kept on ice if more advanced solutions are on the horizon. But firms may also delay if they are gloomy about the prospects for demand or more favorable regulation

In sectors that require highly specialized technologies, such as the pharmaceutical and aerospace industries, market conditions are likely to weigh heavily on investment choices. For example, the COVID-19 pandemic highlighted the powerful role of surging demand in accelerating the development of mRNA vaccines, e-commerce and remote working technologies.

How does your research analyze this innovation dilemma?

Our paper examines the optimal strategy for a firm that can invest in an existing technology or wait until a superior technology becomes available. The novelty of our model is that a technological breakthrough occurs only when market conditions make it sufficiently profitable. This is because the superior technology is only supplied when developers can cover their costs with their share of the surplus it produces for the firm.

The evolution of the market provides the firm with information about both the desirability of investment and the developers' cost. This leads to rich two-dimensional dynamics as the firm is able to learn from past conditions about the likelihood of benefiting from the superior technology in the future.

What do your findings reveal about when firms are likely to invest?

Our results suggest that firms will only invest in the existing technology once they become sufficiently pessimistic about future gains from the superior technology. This only happens in an economic downturn, when market conditions deteriorate sufficiently after a peak. To borrow Lewis Carroll's phrase, firms lose their faith in the prospect of 'jam tomorrow' when the downside risks loom large.

By contrast, investment in the superior technology occurs when the economy is booming. This is because favorable market conditions increase the profits that are shared with successful developers, giving them stronger incentives to innovate. A decrease in development costs, or an increase in the value of the superior technology, will encourage the firm to hold out for a technological breakthrough. These factors can make it difficult to convince the firm to invest in existing technology, ramping up the required return for adoption to arbitrarily high values.

How might policymakers use these insights to encourage the spread of innovation?

Like firms, governments will need to weigh the arguments for technology today or technology tomorrow. Either way, our research shows that regulators seeking to boost innovation must pay close attention to market conditions. Simply subsidizing investment may not be enough to spur widespread diffusion of existing solutions, especially when the economy is booming. If firms believe better technology is coming, they may still delay investment.

One solution is to incentivize earlier adoption by reducing uncertainty. For instance, if policymakers commit to long-term subsidies for green technologies, firms may feel more

rr **Simply subsidizing investment may not be enough for regulators to spur widespread diffusion of existing solutions, especially when the economy is booming**

confident investing now rather than waiting for better alternatives.

Our research shows that it is essential for policymakers to focus on creating the right conditions for technological breakthroughs to occur. This includes actively promoting R&D within companies, providing regulatory transparency and targeted incentives, and investing in the training of high-level scientists and engineers. More broadly, regulators must develop an all-purpose toolkit for influencing market conditions both directly and indirectly – using public investment, strategic procurement, and policy stability – to help position their country sustainably at the frontier of technological innovation.

KEY TAKEAWAYS

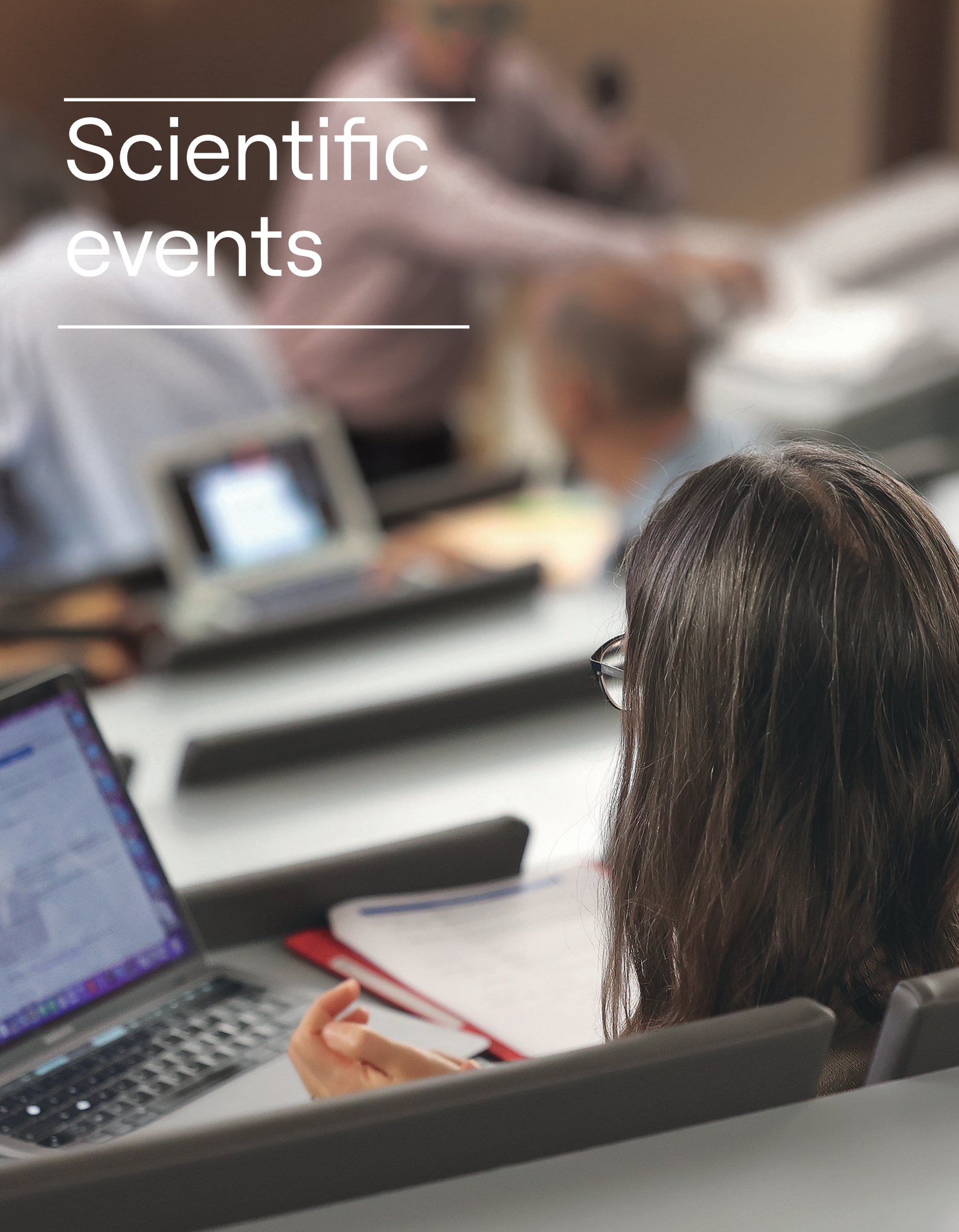
- Jam tomorrow – Firms may be reluctant to invest in today's viable technologies when they expect better options in the future.
- Markets shape investment decisions – Firms assess not just the benefits of the technology itself, but also economic trends, downside risk and regulatory stability.
- Boom and bust – Companies are more likely to invest in existing solutions in economic downturns; upturns encourage firms to hold out for technological advances.
- Policymakers must address uncertainty – Clear incentives, information and regulatory stability can encourage earlier adoption of beneficial innovations.

FURTHER READING

'[Investment Timing and Technological Breakthroughs](#)' by Jean-Paul Décamps, Fabien Gensbittel and Thomas Mariotti. Other publications by these researchers are available to read on the [TSE website](#).



Scientific events



Science in the spirit of Denis Kessler

A prominent economist and influential figure in the world of insurance and public policy, Denis Kessler served as Chairman and CEO of SCOR, leading its transformation into one of the world's top reinsurers. His contributions also include important academic works and a steadfast commitment to fostering rigorous economic thought and public debate. On March 20, TSE and the SCOR Foundation for Science organized a scientific conference at the Maison de la Chimie in Paris to honor these efforts and achievements. The event brought together around 60 participants, including distinguished academics, former colleagues, fellow members of the Académie des sciences morales et politiques, friends and family. Throughout the day, presentations and discussions revisited the intellectual debates that fascinated him and which continue to shape economic research and decision-making today. Denis passed away in June 2023, but his spirit is alive and well.



Exploring risk, innovation, and inequality: A tribute in research

Introduced by Stéphane Villeneuve (Toulouse School of Economics), Scientific Director of the Risk Markets and Value Creation Chair, the conference featured presentations by several researchers whose work Denis Kessler had encouraged, and with whom he regularly exchanged ideas. At the request of the organizers, they presented work highlighting themes close to Denis Kessler's heart.

- Privacy in the digital age

Jean Tirole (Toulouse School of Economics) discussed privacy in the digital age. He stressed the need to use social science to develop intelligent regulations, pointing out that the absence of a balanced framework (imposing rules of transparency and informed consent through better control of privacy settings) could have serious repercussions for democracy.

- Insurers' M&A in the United States during the 1990-2022 period: Is the Fed monetary policy a causal factor?

Georges Dionne (HEC Montréal) reported on the results of his study of insurer mergers and acquisitions in the United States between 1990 and 2022. He outlined the main factors behind the consolidation of the insurance industry in recent decades. He also highlighted the impact of low interest rates on the annuity market for life insurers, and their role in intensifying M&A activity. [Link to presentation.](#)



- **Artificial intelligence, the collapse of the middle class, and oligarchy**

Gilles Saint-Paul (Paris School of Economics) presented his work on the impact of AI on the labor market, economic inequality and redistribution. He examined these dynamics from the perspective of post-Fordism and economic oligarchy, arguing for redistributive reforms to mitigate the negative effects of AI. [Link to presentation.](#)

- **Human capital, inequality and the family**

Finally, Pierre-André Chiappori (Columbia University, SCOR Foundation for Science), shared his research on the influence of changing family structures on wealth and inequality, focusing particularly on the situation in the USA. He explained numerous concepts such as the "diffraction effect", the "Great Gatsby Curve" and the "marital college premium". He concluded his presentation with a recommendation for breaking the inequality spiral: invest early in children's lives. [Link to presentation.](#)

From academia to industry: The lasting influence of Denis Kessler

At the close of the conference, former colleagues and friends paid their respects to Denis Kessler. They included Christian Gollier (Managing Director, Toulouse School of Economics), Michel Pébereau (Honorary Chairman of BNP Paribas), Philippe Trainar (Director, SCOR Foundation for Science), André Masson (Research Director, Paris School of Economics) and Pierre Pestieau (Professor of Economics, University of Liège).

The occasion provided an opportunity to review Denis Kessler's exceptional career, from his commitment to the academic world to his responsibilities at the Fédération française des sociétés d'assurances, the Conseil national du patronat français (formerly MEDEF) and, of course, SCOR. He is remembered for his brilliance, passion for research and commitment to high-level intellectual debate. Several speakers emphasized his unwavering commitment to academic freedom. They also highlighted his career as an entrepreneur. A man of action, Denis Kessler embodied the example of an economist putting his skills at the service of business to meet major contemporary challenges. A visionary, he anticipated the challenges facing France's pension system as early as the 1980s. For several decades, discussions with him were a source of inspiration for many of the people he met, particularly on fascinating subjects relating to the "art and science of risk". His exceptional career remains a source of inspiration for the economists, inspiring them to boldly pursue the quest for knowledge and action in an ever-changing world. Today, the SCOR Foundation for Science actively upholds this legacy, supporting the work of many leading academic institutions in the field of economics.

Denis was always convinced that private-sector support for the best academic initiatives was vital to our country's future. In this, as in so many other areas, he was a committed and visionary economist.

Christian Gollier



From left: André Masson, Michel Pébereau, Philippe Trainar, Christian Gollier and Pierre Pestieau

Workshop on machine learning methods for econometrics

Toulouse School of Economics and SCOR Foundation for Science co-organized the Workshop on machine learning methods for econometrics on January 31 in Paris. This event brought together leading researchers and industry experts to discuss the applications, advantages, and limitations of machine learning in econometrics.



Attending this afternoon's workshop at the SCOR premises, Philippe Trainar (SCOR Foundation for Science) emphasized the strategic importance of machine learning for SCOR, highlighting its growing impact. Stéphane Villeneuve (TSE) introduced the workshop, outlining key discussions on its benefits and constraints.

Nour Meddahi (TSE) presented machine learning's strengths in estimating conditional probabilities such as default risk and conditional expectations such as weather forecasting. The program featured insights from René Garcia (TSE & Université de Montréal), Christian Gourieroux (TSE & University of Toronto), and Dacheng Xiu (University of Chicago), covering portfolio allocation, cyber risk, and asset pricing.



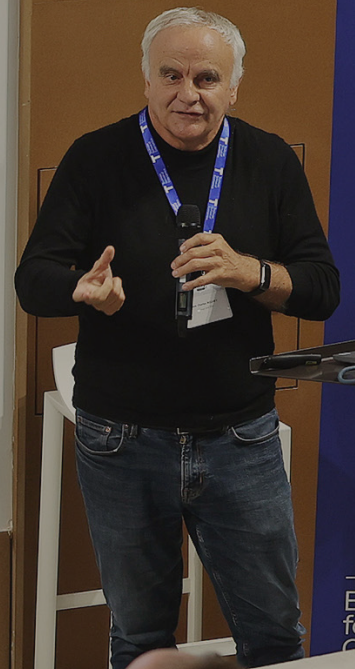
n (2011) has shown that:

ance (advantageous

, modern insurers know
Colombo-Tedeschi (2020),
lection).

La parole est à : Auditorium 3 Je...

Scientific⁵ contributions



Working papers

- **Helmuth Cremer, and Firouz Gahvari**, "[*Endogenous altruism and long term care policies in a Mirrleesian setting*](#)", TSE Working Paper, n. 25-1626, March 2025.
- **Felix Dammann, Néofytos Rodosthenous, and Stéphane Villeneuve**, "[*A Stochastic Non-Zero-Sum Game of Controlling the Debt-to-GDP Ratio*](#)", TSE Working Paper, n. 24-1481, October 2024.

Articles in peer-reviewed journals

- **Christian Gollier**, "[*The welfare cost of ignoring the beta*](#)", Journal of Political Economy Microeconomics, 2025, forthcoming.
- **Matthew Adler, Maddalena Ferranna, James K. Hammitt, Eugénie de Laubier, and Nicolas Treich**, "[*Fair Innings: An Empirical Test*](#)", Health Economics, 2025, forthcoming.
- **Eduardo Abi Jaber, and Stéphane Villeneuve**, "[*Gaussian Agency problems with memory and Linear Contracts*](#)", Finance and Stochastics, vol. 29, January 2025, p. 143–176.
- **Christian Gollier**, "[*The cost-efficiency carbon pricing puzzle*](#)", Journal of Environmental Economics and Management, vol. 128, n. 103062, November 2024.
- **Christian Gollier**, "[*Evaluating sustainability actions under uncertainty: the role of improbable extreme scenarios*](#)", The Geneva Risk and Insurance Review, vol. 49, March 2024, pp. 59–74.
- **M. A. Drupp, M. C. Hänsel, E. P. Fenichel, Mark Freeman, Christian Gollier, Ben Groom, G. M. Heal, P. H. Howard, Antony Millner, F. C. Moore, F. Nesje, M. F. Quaas, Sjak Smulders, Thomas Sterner, Christian Traeger, and F. Venmans**, "[*Accounting for the increasing benefits from scarce ecosystems*](#)", Science, vol. 383, n. 6687, March 2024, pp. 1062–1064.

For the full list of research projects conducted as part of the TSE-SCOR Chair on Risk Markets and Value Creation, see the partnership's dedicated [web page](#).

Photos: StudioTchiz, TSE, Adobe Stock

Toulouse School of Economics
1, Esplanade de l'Université
31080 Toulouse Cedex 06
Tel: +33 (0)5 67 73 27 68
www.tse-fr.eu
partnership@tse-fr.eu

With the support of:


FOUNDATION FOR SCIENCE

FOUNDATION 
DU RISQUE